HEALTH ASPECTS OF PESTICIDES

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ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDES PROGRAMS

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HEALTH ASPECTS OF PESTICIDES ABSTRACT BULLETIN is a monthly publication of the Division of Pesticide Community Studies of the Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides on humans. The publication represents a monthly review of more than 500 domestic and foreign journals. Subjects and authors of abstracted articles are cross-referenced in an annual index issue. Reprint requests should be directed to the author of the complete article.

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CONTENTS

Vol. 5 June 1972 No. 6

Page

General 259

Monitoring and Residues 268

Epidemiology, Prevention and Treatment 278

Toxicology and Pharmacology 286

Analysis 305

Quarterly Index (April-June)
Preface i
Subject Index
I. Compounds ii
II. Concepts xxx
Author Index
I. Personal lxiv
II. Corporate lxxv

72-1125. Smith, I. C. (Western Agricultural Chemicals Association, Sacramento, CA). **Pesticide container disposal problems.** *Agrichem. Age 15(3): 10; 1972.*

It is recommended that the chemical industry use containers that can be recycled, reused or disposed of safely. The State Legislature of California has begun to legislate in this area. California waste disposal sites have been evaluated and classified for disposal of materials which are a potential water pollution problem, and even the 15 sites designated to receive used pesticide containers are not entirely desirable. Western Agricultural Chemicals Association has encouraged the development of waste handling systems, such as Aerojet's toxic waste disposal system and George Poppic's mobile unit for decontaminating and recycling steel containers. California uses over 8 million drums per year. Care must be taken to properly clean and store drums before disposal.

72-1126. Cornwell, P. B. (Rentokil Ltd., Felcourt, Sussex. U.K.). **Pest control and environmental pollution.** *Arch. Lebensmittelhyg. 23(2): 21-25; 1972.* (17 references)

Problems created by pesticides have been primarily due to their non-specific nature, persistence, or widespread agricultural application. Poor application practices, and a lack of knowledge of the fate of certain types of pesticides have been responsible for considerable damage to wildlife. Many recent reports in the press, however, have attributed such incidents as "fish kills" to pesticides when evidence later indicated other causes. Man has been influencing his environment in a variety of ways for many years. Achievements such as the elimination of malaria, tremendous financial savings to agriculture, and prevention of famine through the use of pesticides cannot be forgotten. The continuing need for pesticides, preferably those having fewer side-effects, has directed research to more selective, less persistent chemicals and alternatives. It is necessary for industry and government to work together to formulate a reasonable, international approach to pesticides.

72-1127. Hayes, Jr., W. J. (Toxicology Center, Biochemistry Dept., Medical School, Vanderbilt U., Nashville, TN). **La inocuidad del DDT en el hombre demostrada en el control de la malaria. [The harmlessness of DDT to man as demonstrated in malaria control programs.]** *Bol. Of. Sanit. Panamer. 71(6): 481-499; 1971.* (80 references) (Spanish)

The use of DDT in malaria eradication and other programs seems to offer no threat to man at present. The quantities of DDT currently consumed by humans are quite low, especially in view of the low toxicity of DDT in man. Potential hazards such as carcinogenesis, mutagenesis and enzyme induction have merely been hinted at in some experimental situations, so that their actual likelihood seems quite low. Therefore, any danger to man will reside in the future, and the principal danger of DDT at present is to wildlife. Some countries can afford to restrict the use of DDT in order to protect wildlife, but in other countries, DDT must continue to be employed until suitable substitutes are found. Indoor spraying of DDT as used in malaria control produces little contamination of the environment, and poses no threat to inhabitants of sprayed houses.

72-1128. Whorton, J. C. (Author address not given). **Insecticide spray residues and public health: 1865-1938.** *Bull. Hist. Med. 45: 219-241; 1971.* (87 references)

The history of the use of arsenicals in the U.S. is reviewed. Use of these chemicals was begun in the 1860's when mechanical methods were unable to handle large increases in insects caused by the introduction of large, single crop farms. Initial fears of farmers for their crops, livestock and families were dispelled by the agricultural press. Most of the experimental work was concerned with acute poisoning and reassurances based on this work went generally unopposed, although many in the medical profession were aware of chronic arsenicism. Several incidents pointed to the need for control of arsenicals by the 1920's, but the Bureau of Chemistry, responsible for such control, failed to take necessary action because of a conflict of interests involving the Department of Agriculture, of which it was a part. Action by the British government led to an effort to save the British fruit market by setting low tolerances for residues on exported fruit but realistic limits were not established for domestic produce. Finally in 1932 a tolerance limit of 0.01 grain/lb was achieved, and medical and consumer groups began to actively work for control of this and other poisons. The controversy over arsenicals was moderated by the passage of the Food, Drug and Cosmetic Act and disappeared following the introduction of synthetic organic insecticides which are expected to solve the problem.

72-1129. Anonymous. **Pesticides under fire.** *Chem. Week 110(14): 13; 1972.*

Recent developments in regulation of pesticide use include a dispute in Maine over the use of the herbicide 2,4,5-T in a state park. The park was donated on the condition that it be maintained in its natural state, and environmentalists fear that the herbicide would endanger the ecology of the park. In another area, the Environmental Protection Agency suspended 12 alkyl mercury products and initiated hearings for cancellation of federal registration of the 750 uses of mercury pesticides. It has also proposed new rules which should help a manufacturer get a fast hearing and decision in order to avoid irreparable damage to the reputation of the product being questioned.

72-1130. Williams, C. S. (Dow Chemical Co., Midland, MI 48640). **The current status of phenoxy herbicides.** *Down Earth 27(4): 20-24; 1972.*

The phenoxy herbicides 2,4-D, 2,4,5-T, silvex, and MCPA have been used for at least 20 yr without ill effects in humans or wildlife. Although scientific studies undertaken by the Task Force of the manufacturers and by the USDA and FDA have indicated that when used according to label instructions the compounds are not hazardous to man or the environment, 2,4,5-T application on food crops is still being reviewed by the Environmental Protection Agency. The manufacturers' interest in the issue is not one of economics but one of principle. A discussion of the events surrounding the EPA review of the compounds is presented. The hesitation on approval of 2,4,5-T resulted in part from studies indicating that high doses were teratogenic. Subsequently, a contaminant, 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) was found to be responsible. It has been shown that 2,4,5-T can be manufactured using techniques to assure a level of TCDD of less than 0.5 ppm. The behavior of TCDD in soil and low levels of contamination indicate that 2,4,5-T can be safely used as an herbicide on food crops. Canada has already allowed for registration of the product. Most toxicologists do not believe that demonstration of a teratogenic effect at doses far in excess of possible exposure should be grounds for banning a compound. The withdrawal of 2,4,5-T would cost the U.S. farmer approximately $290 million.

72-1131. Anonymous. **The farmer and pollution: garbage heaps threaten man.** *Farming S. Afr. 47(8): 6-9,11,13; 1971.*

Agricultural pollution in South Africa, while not as great as in Europe and America, has become a real problem. Erosion of 363 million tons of soil caused by overcropping and overgrazing has contaminated drinking water, silted dams and depleted the land. Poor fertilizing practices have left soils too acid, creating molybdenum deficiencies, or too alkaline, creating deficiencies of iron, manganese and other metals. Citrus orchards have been poisoned with copper from antifungal sprays and some micro-elements (e.g. zinc) from improper fertilizers have caused damage. The result of these practices has been the replacement of desirable vegetation with undesirable plants, desert sand and other desert-like conditions. Further problems were created by the introduction of foreign plants, some of them poisonous to livestock. Pesticides have destroyed the balance of nature and must be used more heavily than before to control the resulting plague proportions of some insects. Fortunately, in South Africa the hot climate promotes the degradation of the more persistent insecticides. Horticultural waste and slaughterhouse waste in cities have been a breeding ground for insects and presented a pollution problem. Moving these wastes to areas of agricultural production could prevent this and produce fertilizer at the same time.

72-1132. Anonymous. **Measures against pollution: wide investigation.** *Farming S. Afr. 47(8): 13; 1971.*

A committee representing all State Departments, Provincial Administrations and other bodies concerned with pollution was organized with the following responsibilities: evaluation of new applications for registration of pesticides and reevaluation of existing registrations; improvement of the Fertilizers, Farm Feed, Agricultural Remedies and Stock Remedies Act of 1947; and investigation of other areas of pesticide pollution. The Agricultural Technical Services, one of the participating departments, has just established a unit for research on the effect of pesticides on the environment which will continue work begun on dieldrin.

72-1133. Greenfield, S. M. (Research and Monitoring, Environmental Protection Agency, Washington, DC 20460). **Monitoring the environment.** *J. Ass. Offic. Anal. Chem. 55(2): 235-238; 1972.*

Awareness that man's activities are beginning to threaten his prospects for long-term survival has made it necessary to press for simultaneous advances in many aspects of environmental protection. Scientific monitoring of environmental factors and establishment of baselines in order to detect changes has had to accompany, rather than precede, the establishment of standards. Although the long-term effects and ultimate fates of many pesticides are unknown, some have been found to be unexpectedly persistent, and immediate action is required to reduce their discharge into the environment. The scientifically untrained public, which regards pesticide contamination as a mysterious, insidious hazard, probably does not realize how much effort has already been expended toward the precise determination of pesticide contamination levels as part of the overall pollution monitoring efforts. (Banquet Address, 85th Annual Meeting of the AOAC, Oct. 11-14, 1971, Washington, D.C.)

72-1134. Shiraki, H. (Tokyo Univ., School of Medicine, Bunkyo-ku, Tokyo, Japan). **[The health crisis by environmental pollution (Part 1).]** *Kankyo Hakai (Environ. Destruct.) 3(4): 263-267; 1972.* (Japanese)

In 1966, the author and his colleagues testified at the special hearing of the House of Representative Scientific Technological Advancement Policy Commission against the danger of mercury in agricultural chemicals. The data used most emphatically at that time were obtained from the Saku General Hospital where an alarmingly high mercury content was detected in the hair of mothers and newborn babies. As a result, countermeasures were established by the recommendations of the commission concerning the use of mercury-containing pesticides. A review of published material since then reveals that the average mercury content in the hair of the Japanese is 6.5 ppm, which is 3 to 60 times higher than any European (excepting the Spanish)

or American average. According to the quantitative studies, it was discovered that within the past several years, 10 to 80% of inorganic mercury content in ordinary Japanese have turned into methyl mercury. The possibility of inorganic mercury turning into methyl mercury had been studied by Swedish scientists in the past. More recently, experiments with tracing mercury conducted by Professor Ukita and others have testified to the fact that inorganic mercury can turn into methyl mercury in the presence of vitamin B12. According to these experiments, under conditions of pH 7.0, 37°C temperature, and a dark environment, the major part of methyl group in vitamin B12 will turn into methyl mercury in two hours, and within 24 hours, this will happen to all inorganic mercury. Methylcobaloxime has shown similar results. About a month after the Ukita publication, studies were published by American scientists confirming these results. These three necessary conditions are found in the internal environment of human body, and the presence of vitamin B12 in the body assures the turning of inorganic mercury into methyl mercury. A fundamental countermeasure must be developed in the manufacture of mercury containing agricultural chemicals.

72-1135. Muench, W. D. (Braunschweig, Germany). **Zulassung und Anwendung von DDT, techn. Hexa, Amitrol und 2,4,5-T sowie Endrin und Giftweizen im Forstschutz. [Approval and use of DDT, technical Hexa, amitrole and 2,4,5-T as well as endrin and poisoned grain in forestry.]** *Nachrbl. Deut. Pflanzenschutzdienstes 23(10): 156; 1971.* (German)

Recent announcements by the West German Federal Biological Institute, in cooperation with the West German Federal Public Health Bureau, are presented and discussed. Permission was given for continued limited use of DDT against large brown proboscid beetles and spruce budworms until the end of 1974 at the latest. Only preparations containing DDT as the sole active ingredient are permitted. The use of technical Hexa will be permitted until December 1974, in accordance with the guidelines issued in Notice No. 10, 1969; however, aerial application is not permitted. Amitrole may be used until May 15, 1973, in preparation for cropping. The aerial application of 2,4,5-T requires permission from regional authorities. Permission was withdrawn for the use of endrin against mice and moles, and for the use of zinc phosphide-poisoned wheat. Excessive effects on non-target animals, especially wildlife, are given as the reason for withdrawal.

72-1136. Anonymous. **Eclipse of the stinging fire ant.** *Nature (London) 235(5338): 353; 1972.*

Following a scientific review of mirex, a result of a provision of the Federal Insecticide, Fungicide and Rodenticide Act for manufacturers whose product registrations have been cancelled by the Environmental Protection Agency, a committee has recommended that the use of the pesticide against the fire ant in the Southeastern U.S. be continued. A program against the fire ant is considered necessary and mirex seemed to be the least damaging agent available, but recommended use is restricted to areas where the ant is particularly a nuisance and where damage to the environment would be minimal. A National Defense Council committee concluded, in 1967, that it would be impossible and undesirable to eradicate the ant. Environmental Defense Fund sought an injunction to prevent the use of mirex for eradication of an insect. The fire ant is not a major pest of plants or animals, and the persistence of mirex and the lack of chronic toxicity data on it have caused environmentalists to question use of the chemical. The decision to retain it was based on low acute toxicity and the fact that it does not concentrate in the human food chain.

72-1137. Coenen, R.; Fritsch, W.; Goetzmann, S.; Kesberger, H.; Langhein, J.; Piotrowski, H. D.; Schladitz, R. (Studiengruppe fuer Systemforschung e.V., Heidelberg, Germany). **Chemisch-toxikologische Probleme des Umweltschutzes. [Chemical-toxicological problems of environmental protection.]** *Naturwissenschaften 59(3): 106-111; 1972.* (3 references) (German)

Within the framework of a questionnaire-study conducted by the Study Group for Systems Research in Heidelberg at the request of the West German government, 46 experts from the academic, industrial and civil service fields were asked for their opinions on the environmental threat posed by pesticides. According to the 23 experts who responded, the dangers include deficient biodegradability and specificity, as well as toxicity of pesticides and their degradation products. Organometallic compounds, substituted (especially chlorinated) hydrocarbons, carbamates, phenylureas, alkylating substances, acid anilides, nitro compounds, aminotriazoles and growth regulators were regarded as potentially dangerous. Opinions on organophosphates and 2,4-D varied. Analytical methods for residues were generally regarded as satisfactory; the continuous monitoring methods were considered desirable. Difficulties in analysis are especially caused by interference due to naturally occurring components of the specimen being analyzed and by reactions of the active component. Some of the experts suggested means of reducing pesticide consumption to a minimum, such as the use of biological and physical control methods.

72-1138. Thompson, F. B. (Hamilton, New Zealand). **Oils, inorganic insecticides, miscellaneous.** *N. Z. J. Agr. 124(1): 51, 53; 1972.*

In this concluding section of a series of properties and uses of insecticides, the author, former registrar of the Agricultural Chemicals Board of New Zealand, discusses miscellaneous products not covered in other

categories. Mineral oil derivatives are included in the formulations of 41 fully registered preparations in New Zealand; they represent various mixtures of components, and are called by a variety of names. While not extremely toxic, if oils are swallowed, their passage through the body should be accelerated with purgatives. Calcium cyanide is used as a fumigant; it releases hydrogen cyanide upon contact with the moisture in the air. Concentrations of more than 200 ppm in air are fatal to man as well as to target organisms, so that respirators and protective clothing must be worn during use. Hydrogen cyanide is also flammable. First aid entails restoration of breathing and induction of vomiting. Attention by a physician is required. Fumigated areas should be well ventilated before re-entering. Lead arsenate is an inorganic insecticide used on horticultural crops; after use on pip fruits, a waiting period of six weeks is required before harvest, as it leaves persistent residues. The insecticidal uses of *Bacillus thuringiensis* are briefly described. Finally, the author recommends that requisite caution be exercised when applying pesticides.

72-1139. Anonymous. **Tolerances de residus de pesticides dans les produits alimentaires. [Maximum allowable pesticide residues in food.]** *Phytoma 231: 40; 1971.* (French)

In accordance with the regulations being developed by the European Economic Council, authorization for the establishment of maximum allowable pesticide contents in food was provided in France by the decree of July 30, 1971. This decree prohibits the marketing of food and beverages containing pesticide residues in amounts dangerous to human health, even after an extended period of consumption. The maximum allowable pesticide residues will be determined jointly by the appropriate ministries.

72-1140. Kazmierczak. T. (Poznan, Poland). **Dopuszczalne tolerancje i zapobieganie nadmiernemu skazeniu produktow spozywczych pestycydami. [Permissible tolerances and prevention of excessive contamination of foods with pesticides.]** *Przem. Spozyw. 26(2): 56-61; 1972.* (19 references) (Polish)

Control of food contamination with pesticides in Poland involves seven ministries: Agriculture, Food Industry, Transport, Public Health, Foreign Trade, Forestry, and Chemical Industries. The lack of coordination in their activities is criticized. Discussions are focused on DDT residues as affected by techniques of application. The need for centralized research in terms of unitary design of priorities, unified analytical methods, centralized statistical data processing, and standardized sampling procedures in the monitoring of pesticide residues is emphasized. Prophylaxis of food contamination with pesticides should constitute the main concern of the food processing industries. Only close cooperation between the various food producing agencies can provide satisfactory agricultural growth and safe, high quality food products for international trade.

72-1141. Eyl, T. B. (Author address not given). **Tempest in a teapot.** *Amer. J. Clin. Nutr. 24: 1199-1203; 1971.* (28 references)

There is a great deal of evidence suggesting that the public is over-reacting to the presence of small quantities of methyl mercury in fish. That a certain amount can be consumed regularly without effect is demonstrated by the lack of neurological lesions in people in Japan who consumed contaminated fish and did not become ill. In a Swedish study, people who consumed large quantities of fish in an area where methyl mercury levels in fish were 10 times greater than in canned tuna showed no signs of illness although red blood cell levels were as high as 1,200 ppb. The only known poisoning from legitimate foods occurred in Japan and levels there were extremely high and the fish were dying. There are many substances which we use daily such as nicotine, codeine, and other drugs and pesticides, which have equal or greater toxicity, and many preventable deaths occur from heart disease, automobile accidents, etc. While the hazard must be researched and controlled, a more balanced viewpoint is needed.

72-1142. Zopf. L. G. (College of Pharmacy, U. of Iowa, Iowa City, IA). **Pharmacy-veterinary medicine relations.** *J. Amer. Pharm. Ass. 11(4): 168-170; 1970.*

To promote better understanding and cooperation between pharmacists and veterinarians, the American Pharmaceutical Association established a Commission on Pharmacy and Veterinary Medicine. A Code of Interprofessional Relations, drug abuse and distribution, and broadening of academic programs were discussed. A course in veterinary pharmaceutics is given at 41% of the pharmacy colleges. The course instituted at the University of Iowa is particularly good since it draws on the faculty of the college of veterinary medicine. It includes a study of insecticides, rodenticides, herbicides and fungicides from the veterinarian's viewpoint. A project of the CPVM is the development of a veterinary formulary which will bridge the gap between human drug references and veterinary references.

72-1143. Bunting, A. H. (U. of Reading, Reading, Berks, England). **Pests, population and poverty in the developing world.** *J. Roy. Soc. Encour. Arts Mfr. Commer. 120(5188): 227-239; 1972.*

Although population is increasing in the developing nations, food production *per capita* is also increasing in most cases. Through an immediate concerted effort to find the best combination of farming systems, plant and animal breeding, biological control and biocides (considering social costs and benefits as well as the needs, opportunities and capabilities of farm people),

both the nutritional and general economic level of the agricultural countries can be raised. Biocides will continue to play an important role, particularly in tropical nations where farming events are rapid and weed growth or pest attacks can be sudden, unpredictable and devastating. There has been a great deal of exaggeration of the part that biocides have contributed in the deaths of wildlife and pollution of the oceans. Chlorinated hydrocarbons, which have caused very few accidental human deaths, are being hastily replaced by organophosphates which have caused large numbers of accidental deaths. Research is needed to improve biocides and methods of application, but their continued use is certain.

72-1144. Anonymous. **First all-India symposium on progress and problems in pesticide residue analysis.** *Pestic. Annu. 5(12): 32-33; 1971.*

A total of 52 papers were presented at the all-India symposium, concerning the status of pesticide residues in food, feed and soil; the analytical problems; and the development of residue tolerances for the country. The recommendations made at the sessions included: publication of the proceedings; semi-annual dissemination of scientific data collected; supplementation of existing facilities with more sophisticated instrumentation including the means of servicing it; and enlargement of the qualified staff. Residue studies should include zonal surveys of foodgrains, oilseeds and potatoes, with attention also on the terminal residues. The most suitable analytical methods should be chosen for wide use, with standards available throughout the country. The number of pesticides approved should be minimal and all toxicology and residue data should be reviewed before approval. Chemicals in use giving residues higher than those recommended by WHO/FAO should be withdrawn. The tolerances recommended by the Codex Alimentarium Commission and the Joint Pesticides Committee of WHO/FAO should be considered for adoption. Thorough washing or peeling of fruits and vegetables should be encouraged. Medical screening programs ought to protect workers in the industries concerned from serious illness.

72-1145. Bindra, O. S. (Dept. of Zoology–Entomology, Punjab Agricultural U., Ludhiana, India). **The magnitude of pesticidal pollution in India.** *Pestic. Annu. 5(12): 81-85; 1971.* (10 references)

Although the use of pesticides is only about 1/10 that in Europe and the U.S., levels of DDT and its metabolites in human fat in India were found to be the highest in the world. A survey of available statistics on the DDT content of air, soil, water, and foods indicates that a high dietary intake, mainly in cereals, is responsible for the high level in fat. Little information was available on air (not considered a general problem), and water, and the soil samples did not contain unusually high amounts. Foodstuffs contained variable amounts ranging from an average of 0.039 ppm in eggs to 0.53 ppm in meats. It is suggested that malathion, pyrethrum and similar chemicals be investigated for use on grains and that less persistent chemicals also be used on fruits and vegetables. Dissipation times and application-to-market waiting times must be established, and since it has been found that cooking reduces and washing nearly eliminates residues, such home-processing should be encouraged.

72-1146. Wilks, L. P. (Velsicol Chemical Corporation, Chicago, IL). **The meaning of LD50.** *Pestic. Annu. 5(12): 86-90; 1971.* (2 references)

Assurance is given of the careful regulation of pesticides by government and industry. Through the explanation of the LD50, a measure of acute toxicity, and the many phases of chronic toxicity studies the author hopes to inform his readers of the costly procedures which industry uses to obtain registration and continue to assure safety for products. Chlordane, used over a period of at least 20 years without demonstrated detrimental effects on man or his environment, is an example of a safe compound in a class of compounds which is being generally attacked. It is hoped that future regulation of pesticides will be based on data from individual compounds rather than on general, but not necessarily universal, characteristics of classes of compounds.

72-1147. Anonymous. **Pressure on pesticides.** *Chem. Week 110(16): 22; 1972.*

Three actions recently taken by the Environmental Protection Agency (EPA) and one of its scientific advisory committees tend to place additional restrictions on pesticide use. The first of these is the announcement of an extensive study of lindane, benzene hexachloride and endrin to determine whether registration of these pesticides should be suspended. The 900 uses of these materials will be reviewed individually. EPA has also suspended the registration of 23 pesticides for which sufficient data for establishing tolerance levels were not supplied by the manufacturers. Some of the manufacturers, who have 30 days to appeal the suspension, intend to do so; one of these is the PPG Corp., which manufactures 2 of the suspended chemicals, IPC and chloro-IPC. The scientific advisory committee investigating aldrin and dieldrin reported finding no injury to humans from these materials, but recommended that spraying and household use should be banned as a precaution. Manufacturers may request a hearing after EPA decides on the panel's recommendations. Chempar, which manufactures aldrin, dieldrin and endrin, exports the majority of these products and thus does not expect to be seriously affected.

72-1148. Anonymous. **Research heightens concern over PCB's.** *Chem. Eng. News 50(16): 27-28; 1972.*

As discussed in the opening session of the Division of Pesticide Chemistry at the American Chemical Society annual meeting in Boston, Mar. 10, 1972, recent research on polychlorinated biphenyls (PCBs) indicates that their effects are similar to those of DDT. The U.S. product may contain traces of tetrachlorodibenzofuran, a toxic contaminant of European PCBs. Although Monsanto, the sole U.S. producer, is phasing out most of its sales of Aroclor 1254, scientific data on the product are accumulating rapidly. PCBs were found to block the mobilization of calcium response to vitamin D in rachitic chickens, as does DDT. The interference by either compound did not appear to be with the conversion of vitamin D to the active form. Unlike DDT, PCBs did not cause thinning or a change in cross-sectional morphology in eggshells of Japanese quail. In feeding studies, PCBs accumulated in cow's milk and the concentration declined 50% when treatment was stopped, but the rate of decline was small after 15 days. DDT-derived compounds behave in a similar way. A contaminant found in PCBs has not been conclusively identified, but has the same mass spectrum number as tetrachloro-*p*-dibenzofuran.

72-1149. Bauer, U. (Institut fuer Wasserforschung GmbH, Dortmund, Germany). **Polychlorbiphenyle und Wasser. [Polychlorinated biphenyls and water.]** *Gas-Wasserfach Wasser-Abwasser 113(2): 58-63; 1972.* (15 references) (German)

Polychlorinated biphenyls (PCBs) can enter water via leakage from transformers and condensers by leaching from protective coatings on drinking water containers. Therefore, their behavior during the various processes used for the preparation of drinking water was investigated. The addition of Clophen A-60 (a PCB containing 60% chlorine) to a laboratory filter column produced no changes in bacterial count, oxygen content or other water quality criteria. At the beginning of the experiment, 90% of the added Clophen A-60 was absorbed on the gravel prefilter, and after the fifth day of the experiment, 50% was adsorbed. The remainder was adsorbed on the sand filter; the filter depth at which PCB was detectable increased progressively over the experimental duration. Clophen A-60 and A-30 (30% chlorine) were considerably enriched (enrichment rate ca. 1:40) by algae, and this process involved both adsorption and transfer into the cell itself. No degradation of PCBs in the presence of algae was noted under aerobic or anaerobic conditions within one week. Conventional oxidation treatments (permanganate, chlorine, ozone) did not reduce the PCB concentrations. Activated charcoal and flocculating agents removed high percentages of the PCBs, but only when large amounts were used. PCBs were detected at 10 ppt in the upper layer of sand from a long-used main clarifier filter in the Ruhr valley, but not in water from the Ruhr river.

72-1150. Maier-Bode, H. (Pharmakologisches Institut der Rheinischen Friedrich-Wilhelms-Universitaet, Bonn, Germany). **Zur 2,4,5-T-Frage. [The 2,4,5-T-question.]** *Anz. Schaedlingsk. Pflanzenschutz 45(1): 2-6; 1972.* (20 references) (German)

The evidence of harmfulness of the herbicide 2,4,5-T is reviewed in the light of recent legislation. The teratogenic effect of 2,4,5-T at high dosages, demonstrated in laboratory animals in the U.S. in 1969, is attributable to contamination of the lot of 2,4,5-T tested with 30 ppm of the highly toxic 2,3,6,7-tetrachlorodibenzo-*p*-dioxin. At present, the manufacterers guarantee that the dioxin content in technical 2,4,5-T does not exceed 0.1 ppm. However, recent findings indicate that even 2,4,5-T containing not more than 0.1 ppm of 2,3,6,7-tetrachlorodibenzo-*p*-dioxin can produce teratogenic effects in highly sensitive animals if administered orally at sufficiently high dosages. The likelihood of the ingestion of appreciable quantities of 2,4,5-T by man or animals under natural conditions is extremely remote, due to its relatively rapid degradation and low rate of application. Therefore, the West German Federal Advisory Council decided to permit the continued use of 2,4,5-T in agriculture, forestry and horticulture, with the reservation that aerial spraying requires permission from the regional government.

72-1151. Edson, E. F. (Chesterford Park Research Station, near Saffron Walden, Essex, Australia). **Pesticide toxicology – experimental, applied and regulatory.** *World Rev. Pest Contr. 10: 24-30; 1971.*

The need for toxicity studies became apparent during the post-war decade with the advent of highly toxic chemicals, aerial spraying, occupational deaths, and animal poisonings in better-developed as well as under-developed countries. In the next decade, world organizations became concerned over the safety of treated crops as food. At present, studies of metabolism, biochemistry, toxicology and residues are standard requirements for the introduction of new pesticides. Safe experimental use of humans for the detection of the earliest signs of adverse response is necessary to bridge the gap between animal and human data. Extrapolation from animal data raises questions of choice and number of species to be tested and validity of the assumption that human systems will react in the same way. Aside from satisfying government requirements, the industry does toxicology studies to determine which compounds can be used safely by a reasonably well-informed amateur, only by an experienced grower, or not at all, and to establish safety procedures and procedures for diagnosis and treatment of poisoning. In order to avoid unusual accidents, the following areas should be reviewed: governmental limitation of availability of highly toxic chemicals to householders; simplification of labels, development of penalties for the negligent user; proof of need for and development of more comfortable protective clothing, equipment, and methods of use; and establishment of centers for dissemination of new information. The industry welcomes participation of government. More cooperation is needed to make the

Codex Alimentarius of the FAO a successful instrument in keeping free trade and developing international tolerances.

72-1152. Nicholson, H. P. (Agricultural and Industrial Water Pollution Control Research Program, Southeast Water Lab., Athens, GA). **The pesticide burden in water and its significance.** *Proc. Wash. St. Ent. Soc. 30: 293-295; 1970.*

Widespread water pollution could result from only a limited number of pesticidal compounds, since over half of the U.S. production of pesticides is composed of 14 insecticides, 8 fungicides, and 5 herbicides. DDT and other organochlorines along with mercurials have been the most objectionable. Loss of fish populations, seizure of contaminated salmon catches by the FDA and a decline of fish-eating bird populations are all associated with DDT entering waterways. Measurement of water content is not a sufficient means of monitoring organochlorine content since bottom sediment content may be several thousand times greater. Control of pesticide pollution is easiest at the source. Less persistent chemicals should be used where feasible. A new method for predicting pollution associated with rural runoff, being developed at the Southeast Water Laboratory, could aid in pollution prevention. New waste treatment methods should result from research on chemical degradation. Research should also bring new methods of control of pests.

72-1153. Thalenhorst, W. (Author address not given). **Deutsche Forstschutz-Literatur 1969/70. III. Abwehrmassnahmen gegen tierische Schaedlinge. [German Forest Protection Literature 1969/70. Part III. Defense against animal pests.]** *Z. Pflanzenkr. Pflanzenphysiol. Pflanzenschutz 79(1): 34-44; 1972.* (47 references) (German)

The general topics covered in this literature review section are biological control, biophysical control, cultural practices, and chemical methods. The relationships between biological and chemical control methods are complex, since chemical applications can interfere with predator (bird, bat, predatory insect) propagation either via direct toxicity or by removal of predator food supplies. The Plant Protection Law promulgated in West Germany on May 18, 1968, establishes that after the expiration of a two-year transition phase, only those preparations which have undergone thorough investigation and been proven to offer little danger of upsetting the forest ecology will be permitted for application to forests. However, one loophole exists in the fact that wood preservatives are not included in this law, are therefore sold without restriction, and under some circumstances may be used in forestry. As a result of this law, the organochlorine insecticides aldrin, dieldrin, endrin, and heptachlor have been withdrawn from forestry use, and replaced by other pesticides or control methods. However, no replacement has yet been found for DDT in the control of proboscid beetles and spruce budworms, a vital aspect of forest protection.

72-1154. American Mosquito Control Association (Author address not given). **A.M.C.A.'s response to the current ecological era.** *Mosquito News 31(3): 334-346; 1972.*

This panel discussion contains the comments of representatives of regional mosquito control authorities regarding the impact of heightened public interest in ecological questions on mosquito control efforts. In most of the U.S. (and one Canadian) districts, the officials responsible for mosquito control programs became aware of environmental contamination problems long before the general public took up the banner, and switched from the persistent organochlorines to more readily degradable pesticides some time ago. An additional reason for this was the development of resistance to organochlorine pesticides by many mosquito species. Public attitudes toward mosquito control efforts depend on the level of such activity in the area in question, public concern over environmental affairs in general, and specific educational activities of mosquito control agencies.

72-1155. Lunin, J. (Soil and Water Conservation Research Div., U.S. Dept. of Agr., ARS, Beltsville, MD). **Agricultural pollution in perspective.** *World Agr. 20(4): 13-17; 1971.* (10 references)

Pesticides are among the sources of environmental pollution due to agricultural practices, but by no means the only one. In this far-reaching subject area, opinions vary as to the relative importance of pollution due to pesticides compared to that from sediment (land erosion), animal wastes and fertilizers. It is obvious, however, that any reduction in agricultural chemicals usage would most likely be accompanied by a decrease in food and fiber production, making food either more expensive or simply more difficult to obtain. Work is proceeding on the development of alternate control methods, such as the breeding of pest-resistant species, and biological, physical and cultural controls, but such efforts always require much time. Since pesticides will undoubtedly continue to be needed in agriculture, it would represent a worthwhile effort to minimize environmental pollution by unintentional losses, such as spillage, industrial wastes from pesticide manufacturers, residues on agricultural materials, drifts in air, and runoff.

72-1156. Buckley, N. A. (Dept. of Public Health Warrington County Borough, England). **Pollution of the environment.** *J. Inst. Munic. Eng. 99(3): 92-97; 1972.* (8 references)

In Great Britain, significant progress has been made in the control of air pollution since the nineteen-

fifties, and efforts are now underway to improve the condition of British waterways, largely through distribution of responsibilities to the Local Government Authorities. Following the discovery that many of the pesticides used in Great Britain are not as harmless as was originally thought, a voluntary restriction program was initiated. This reduced the use of certain pesticides, including DDT. The residue levels of DDT and dieldrin in human adipose tissue declined simultaneously.

72-1157. Anonymous. **Early warning for pest legislation.** *Int. Pest Contr. 13(5): 7; 1971.*

The member countries of the Organization for Economic Cooperation and Development (OECD) have agreed to a new system of advance warning about planned pest control legislation. Under this system, the respective governments will inform the appropriate agencies in the other member countries whenever a new regulation governing a chemical offering a potential threat to the environment is contemplated. This is expected to help avoid the proliferation of contradictory and confusing pesticide use regulations in these nations, which trade extensively with one another. Announcement of a planned law might be followed by scientific meetings or other consultations at which affected groups could explain their views.

72-1158. Lewin, P. (The Hospital for Sick Children, Toronto, Ontario, Canada). **In support of DDT.** *Can. Med. Ass. J. 106: 13; 1972.*

In a Letter-to-the-Editor, the author expresses concern about the spread of vermin, e.g., mites, lice and fleas, among the human population. He states that such pests have become "much more evident" in the last year since the Federal (Canadian) Government restricted the use of DDT. Suggested replacements (pyrethrins, rotenone, benzoates, etc.) are often more expensive as well as more irritating than DDT to those who come into contact with them. Therefore, the author advocates the reintroduction of DDT for use as an unrestricted household pesticide.

72-1159. Williams, C. S. (Research and Development Div., Dow Chemical Co., Midland, MI 48640). **The status of 2,4-D, 2,4,5-T, silvex and MCPA herbicides.** *Proc. N. Cent. Weed Contr. Conf. 25: 15-18; 1970.*

The chronological sequence of events relating to the use of the herbicides 2,4-D, 2,4-T, silvex, and MCPA, and the regulations governing them are reviewed. In 1966, the seven commercial companies producing one or more of these phenoxy herbicides joined to form the Industry Task Force on Phenoxy Herbicide Tolerances, which would supply governmental agencies with the required regulatory data. Petitions for tolerances in food crops covered by the registered uses of these herbicides were submitted in 1967. Further work, especially on the degradation question, was begun in 1968. Feeding experiments with animals were started the following year. The use of 2,4,5-T was suspended in 1970 on the basis of findings of teratogenic effects in animals; however, it was subsequently discovered that the teratogenicity was due to dioxin contamination, which can be eliminated by proper manufacturing procedures. Data obtained to date indicate no hazard and no significant residues in food crops from use of these herbicides; however, prohibiting their use would significantly raise the cost and effort required to maintain food production levels.

72-1160. Rajendra, M, K.; Dias, C. A. R. (NOCIL, Bombay 18, India). **How much do you know about pyrethrum?** *Pesticides 5(10): 11-13; 1971.* (24 references)

The characteristics and history of pyrethrum are reviewed, from the viewpoint of the possibility of producing and using this insecticide in India. Pyrethrum, produced from the flower heads of *Chrysanthemum cinerariaefolium* and other species, consists of two pyrethrins and two cinerins. It acts as a nerve poison, or possibly as a neuromuscular poison, but its oral toxicity to warm-blooded animals is very low. The greatest hazard to man from contact with pyrethrum dust is that of developing allergic manifestations. Addition of nontoxic synergists greatly increases its effectiveness. No completely satisfactory methods for residue determination have been developed. Preliminary trials have shown that cultivation of pyrethrum-producing plants is feasible in the northern parts of India. Because of the safety and efficacy of pyrethrum, further attempts at pyrethrin production in India are recommended.

72-1161. Jukes, T. H. (Div. of Medical Physics, Donner Lab., U. of California, Berkeley, CA). **Fact and fancy in nutrition and food science.** *J. Amer. Diet. Ass. 59: 203-211; 1971.* (33 references)

The author takes issue with recent trends in public attitudes toward food and its production in a lecture presented at the joint meeting of the California and Nevada Dietetic Associations in Las Vegas, April 19, 1971. He attributes some of the unrealistic public notions about "organic" food production to the estrangement of the urbanized American population from the realities of the daily struggle with the elements which farming still requires. Public hysteria often results in the misinterpretation of analytical and toxicologic test results, he states. The problems faced in determining residue tolerances are well illustrated by the mercury controversy, as well as the findings on DDT in human milk. Although the DDT intake of breast-fed infants in the U.S. may be higher than the level of 0.01 mg/kg body weight established by the World Health Organization, no toxic effects in infants have been observed. A total ban on DDT would wreak havoc on the populations of countries where malaria eradication programs have been in operation.

72-1162. Brown, L. R. (Overseas Development Council, Washington, DC). **The environmental consequences of man's quest for food.** *Ann. N.Y. Acad. Sci. 184: 62-75; 1971.*

In attempting to provide himself with a stable and adequate food supply, man has wrought far-reaching changes in the environment. Since man discovered, about ten thousand years ago, that he could cultivate plants and domesticate animals rather than simply gathering and hunting, the natural cover of about ten percent of earth's land surface has been removed, and the areas planted to crops. Yet much of mankind is still inadequately nourished, if no longer starving outright. Increasing population forces more intensive land use, requiring employment of agricultural chemicals, which in turn cause ecological problems. DDT and other chlorinated hydrocarbons have become widely dispersed in the environment, and are beginning to threaten some forms of animal life. Man seems likely to accumulate higher DDT concentrations in his tissues than many other species because of his omnivorous habits. For example, the average American consumes 100 pounds of beef each year, and cattle themselves accumulate DDT from the large quantities of herbage consumed.

72-1163. Gangstad, E. O. (Planning Div., Civil Works Directorate, Office of the Chief of Engineers, Washington, DC). **Herbicidal control of aquatic plants.** *J. Sanit. Eng. Div., Amer. Soc. Civil Eng. 98(2): 397-406; 1972.* (9 references)

Removal of excessive aquatic plant growth, required for optimal water resource utilization, was performed by mechanical means at first, but is now generally accomplished with the aid of chemicals, especially 2,4-D. The use of herbicides in accordance with recommendations for this purpose will generally have little or no deleterious influence on water quality, crop plant growth or wildlife. The 2,4-D residue levels for various application rates, depths and ambient temperature indicate a 50 to 100% drop within 1 month. Herbicides registered for use on aquatic sites are reviewed. The regulations governing the use of these chemicals, however, leave something to be desired in the specification of use limitations, since rarely is a body of water used for a single purpose, and water frequently travels from one type of area to another before its herbicide content is entirely dissipated.

72-1164. Gilluly, R. H. (Author address not given). **Oceans as alphabet soup: focus on DDT and PCB's.** *Sci. News 101(2): 30-31; 1972.*

Recent studies on the occurrence of DDT and PCBs (polychlorinated biphenyls) in marine organisms have provided a wealth of facts, but the significance of the findings is difficult to determine. Results of studies performed by investigators from the Woods Hole Oceanographic Institution and presented at the Nobel Symposium in August of 1971 indicate that ingestion of DDT and PCBs by multicelled organisms which feed near the sea surface at night but migrate to considerable depths during the day may accelerate transport of organochlorine compounds from the biologically active upper ocean layers to the "abyssal sink". This removal process may explain why large-scale extinctions of life forms have not occurred, although environmental DDT concentrations are theoretically high enough to have caused them. The absence of the anticipated organochlorine concentration gradients in relation to land sources suggests that the atmospheric mode of organochlorine distribution is more important and the water-borne route less so, on a worldwide scale, than previously assumed. An unexpectedly broad range of variability in DDT and PCB concentration up food chains was also encountered, possibly due to the significance of non-food/drink ingestion pathways in aquatic organisms. Sediment cores collected on the 1970 expedition will be analyzed to investigate organochlorine removal from the water column.

72-1165. Moriarty, F. (Monks Wood Experimental Station, Huntingdon, England). **Pollutants and food-chains.** *New Sci. 53(787): 594-596; 1972.*

The compartmental model used to establish relationships of rate of intake and loss of drugs is used to demonstrate the possibility of discounting the theory that insecticides concentrate in the food chain. Data from mammals and some birds and fish indicate that the concentration in tissue is a function of rate of uptake; a constant concentration is reached if intake remains constant over a prolonged period; concentrations in different tissues are correlated; when exposure stops the tissue levels decline. Several experiments have demonstrated that fish may absorb much more pollutant from the water than from ingested food. The case with terrestrial animals is less clear. Laboratory experiments do not support the concentration theory, but data gathered from wildlife, which is exposed to variable conditions, seem to support it. It appears, however, that the rate at which an animal eliminates a pollutant is more important than its position in the food chain.

72-1166. Baba, N.; Ohno, M. (Inst. for Chemical Research, Kyoto U. Uji, Kyoto 611, Japan). **Thermal behavior of allethrin at 150°C in atmospheric environment.** *Agr. Biol. Chem. (Tokyo) 36(1): 56-61; 1972.* (10 references)

In order to assess the effects of dispersal of allethrin into the atmosphere by heating, various allethrin isomers were vaporized in an air stream at 150°C, and the resulting mixtures of components in the air stream analyzed. Authentic specimens of possible decomposition products (formed by isomerization, polymerization and hydrolysis of the starting material) were synthesized and compared by GLC with the airstream constituents obtained in the experiments. Under these vaporization conditions, 28 to 35% of the allethrin vaporized without undergoing changes, 24 to 45% polymerized, and 18 to 40% decomposed. Lactones were formed from *cis*-allethrin and 2-DL-*trans*-allethrin, although the mechanism of their formation has not been elucidated.

72-1167. Archer, T. E.; Toscano, R. A. (Dept. of Environmental Toxicology, U. of California, Davis, CA 95616). **Kelthane residues on Gravenstein apples and pomace – application and removal.** *J. Anim. Sci. 33(6): 1327-1331; 1971.* (5 references)

Gravenstein apples, free from residues of Kelthane (dicofol) and its principal decomposition product, 4,4′-dichlorobenzophenone (4,4′-D) prior to treatment, were sprayed in the laboratory with a solution of Kelthane in acetone, providing a residue of 6.4 ppm on a whole-weight basis. After peeling, extraction, and chromatographic analysis, the peels were found to contain 84% of the total residue, the core-peduncle area 14%, and the flesh 2%, the latter probably due to contamination during peeling. A decontamination trial washing with warm 2% potassium hydroxide solution resulted in removal of 58% of the residue and conversion of a portion of the remainder to the much less toxic 4,4′-D. Washing

with ethyl alcohol removed 98% of the original total Kelthane residues, whereas a comparison washing with benzene removed only 92%. The Kelthane residue on the apples washed with ethyl alcohol had thus been reduced to 0.13 ppm, almost all of which was contained in the pomace (peels and seeds), but which does not represent a hindrance to the use of the pomace in animal feeds.

72-1168. Wilson, L. L.; Kurtz, D. A.; Rugh, M. C.; Chase, L. E.; Ziegler, J. H.; Varela-Alvarez, H.; Borger, M. L. (Dept. of Animal Science, Pennsylvania State U. University Park, PA 16802). **Adipose tissue concentrations of certain pesticides in steers fed apple waste during different parts of the finishing period.** *J. Anim. Sci. 33(6): 1356-1360; 1971.* (16 references)

Apple wastes represent a desirable potential component of animal feed, but their use has proved impractical because of the organochlorine pesticide residues which are often present. The current experiment was intended to determine whether the feeding of such contaminated wastes at different times during the finishing period of the animals would affect pesticide incorporation. Yearling Angus steers were fed control ration for 155 days; or apple waste ration (containing 0.14 ppm dieldrin and 1.61 ppm total DDT) for 80 days and control ration for 75 days; or control ration for 80 days and apple waste ration for 75 days; or apple waste ration for 155 days. Cod fat samples were taken by biopsy on day 80 and from the carcasses at the end of the trial. Pesticide concentrations of carcass fat samples from the second and third groups did not differ significantly, and averaged 0.53 ppm total DDT; total dieldrin averaged 0.1 ppm. Carcass fat from the group fed apple waste ration throughout the finishing period contained 1.07 ppm total DDT and 0.14 ppm dieldrin on the average. A slight decline in pesticide residues during the second experimental period was noted in those animals fed the pesticide-containing wastes only during the first phase of the experiment.

72-1169. Wilson, L. L.; Kurtz, D. A.; Rugh, M. C.; Chase, L. E.; Ziegler, J. H.; Varela-Alvarez, H.; Borger, M. L. (Dept. of Animal Science, Pennsylvania State U., University Park, PA 16802). **Effects of feeding activated carbon on growth rate and pesticide concentrations in adipose tissues of steers fed apple wastes.** *J. Anim. Sci. 33(6): 1361-1364; 1971.* (10 references)

The methodology followed in this experiment was similar to that in the preceding study of pesticide-containing wastes as animal feed (see abstract 72-1168). In the present investigation, activated charcoal was incorporated into the apple-waste-containing or control rations of the cattle during one or both of the time periods of the experiment. Dieldrin concentrations in biopsy and carcass fat were reduced 40 to 43% by feeding activated carbon with the test rations. Mean total DDT concentrations were 24% lower in the activated carbon-treated lots than in the control lots; DDE and DDD accounted for the majority of this reduction, whereas *p,p'*-DDT levels were not lowered significantly by feeding activated carbon along with contaminated wastes. No significant removal of pesticide residues already present in the body was attained by the use of activated carbon.

72-1170. Threewit, T. B.; Slife, F. W. (Dept. of Agronomy, U. of Illinois, Urbana, IL 61801). **Studies on the rate of disappearance of butylate in soil.** *Proc. N. Cent. Weed Contr. Conf. 25: 70-71; 1970.*

Bioassay with sorghum plants was employed examining the disappearance of butylate from soil after application to duplicate plots on two different dates. Butylate was applied at a continuously decreasing logarithmic rate starting at 10 lb/A, then worked into the soil, on April 10 and May 6, 1970. Bioassay results were checked by a soil extraction-colorimetric test. Disappearance of butylate from soil proceeded more rapidly in plots treated on May 6 than on April 10. The butylate loss rate was almost identical, regardless of the application level: a rapid initial drop was followed by a slower, almost steady rate of disappearance. Bioassay detected herbicidal activity only down to the end of the rapid-drop phase. Activity in the bioassay test had disappeared by the 99th day in the plot treated with 10 lb/A on April 10, and by the 73rd day in the plot treated with 10 lb/day on May 6. The chemical analysis revealed that some butylate was still present in November in the soils treated at 6.25 lb/A; since bioassays were negative, the butylate may have been converted into a physiologically inactive form.

72-1171. Bauer, U. (Dortmunder Stadtwerke AG, 5841 Geisecke/Ruhr, Germany). **Abbau von Pestiziden bei der Langsamsandfiltration. [Degradation of pesticides during slow sand filtration.]** *Schriftenr. Ver. Wasser-, Boden-, Lufthyg., Berlin-Dahlem 34: 131-136; 1971.* (8 references) (German)

Previous experimental reports as well as theoretical considerations had suggested that high percentages of the residues of a variety of pesticidal compounds may be removed from water in the course of preparation for drinking, especially during the process of slow sand filtration. Residue removal may be accomplished by mechanical and physical (adsorption, ion exchange); chemical (photochemical, oxidative); or microbial processes. These theories were tested on the herbicide diuron, which is employed in water resource management because of its algicidal activity. Diuron was not appreciably degraded under aerobic conditions on laboratory sand filter columns within 40 days at 20° or 45°C (concentrations: 0.2, 2.0, 20 ppm). No degradation was detectable by spectrophotometric analysis within 14 days under anaerobic conditions at 20°C. After 13 hours of UV-irradiation of 6 ppm aqueous

diuron solutions, only 3% of the diuron was still present in its original form, and 9% as the degradation product, 3,4-dichloroaniline. A reduction from 3 to 1.3 ppm diuron was attained by irradiation with sunlight for 5 hours (in October). Chemical flocculation, permanganate oxidation and adsorption on suspended matter were unsuccessful; adsorption on activated charcoal partly so. Within 24 hours, a diuron concentration of 2.8 ppm was reduced to 0.6 ppm by 0.5 mg/l of chlorine at pH 5.5, with formation of unidentified degradation products.

72-1172. Scholz, L.; Altmann, J. (Institut fuer Wasser-Boden- und Lufthygiene, 1 Berlin 33, Germany). **Versuche zur Entfernung von chlorierten Kohlenwasserstoffen aus dem Trinkwasser mit Verwendung von Kunststoffen und aktiver Kohle. [Experiments on the removal of chlorinated hydrocarbons from drinking water, using plastics and activated charcoal.]** *Schriftenr. Ver. Wasser-, Boden-, Lufthyg., Berlin-Dahlem, 34: 137-142; 1971.* (1 reference) (German)

The removal of aldrin, dieldrin, DDT and lindane from aqueous solutions by filtration over plastic particles was compared with the efficiency of removal by activated charcoal. High-molecular-weight polyethylene was used in granular form, whereas due to their waxy consistency, the low-molecular-weight polyethylenes (MW 1900-3000) and polyisobutylene (MW 10,000 to 15,000) were employed as coatings on a pumice carrier. Activated charcoal removed 68% of the lindane from a 5 μg/l solution, whereas none of the plastics removed more than 11%. About half of the aldrin and dieldrin in the solutions investigated (0.4 and 0.8 μg/l. respectively) was removed by the activated charcoal, whereas the most effective plastics (in this case, Oppanol, the polyisobutylene) removed 88 and 74% respectively. Removal efficiencies for DDT were similar (63%) for charcoal, high-molecular-weight polyethylene, and one lower-molecular-weight sample, and greater (average 86%) for the other plastics. The total capacities of the plastics and activated charcoal were similar. On the whole, the best results were obtained with the lower-molecular-weight plastics, which are regarded as undesirable by-products in manufacturing.

72-1173. Bjerk, J. E.; Holt, G. (Dept. of Pharmacology and Toxicology, Veterinary Coll. of Norway, Oslo, Norway). **Residues of DDE and PCB in eggs from herring gull (*Larus argentatus*) and common gull (*Larus canus*) in Norway.** *Acta. Vet. Scand. 12(3): 429-441; 1971.* (23 references)

Eggshell thickness of 294 herring gull eggs collected from eight Norwegian localities and nine common gull eggs from one of the localities were measured. The organochlorine insecticide and polychlorinated biphenyl (PCB) contents of ten herring gull eggs from each locality and of the common gull eggs were analyzed by gas-liquid chromatography. DDE was found in all of the eggs, at 0.2 to 5.4 ppm in herring gull and 0.2 to 3.5 ppm in common gull. DDT was found only in four herring gull eggs, at 0.1 to 0.3 ppm. No other organochlorine insecticides were detected. PCB residues were found in all herring gull eggs at 0.2 to 3.8 ppm (PCB-10) and in six of the common gull eggs at trace to 0.8 ppm PCB-10. A positive correlation existed between DDE and PCB contents. The DDE and PCB contents varied significantly as a function of locality; however, these variations were not reflected in differences in eggshell thickness, as the latter fluctuated over only a 5% range.

72-1174. Turner, B. C.; Taylor, A. W.; Edwards, W. M. (U.S. Soils Lab., Beltsville, MD). **Dieldrin and heptachlor residues in soybeans.** *Agron. J. 64(2): 237-239; 1972.* (8 references)

Soybeans grown on plots previously used for growing corn may contain residues of organochlorine insecticides used against corn pests. Soybeans were planted in 1970 on experimental fields which had been treated with 5 kg/ha of dieldrin, mixed in by cultivation to a depth of 7.5 cm, in 1970, 1969, 1968, 1967, or 1966. Residue levels in the soybeans grown in the second year after application were considerably lower than those grown in the first, whereas those grown in the third to fifth years showed little change. Beans from the lower half of the plant contained 0.31 ppm when grown on soil treated in 1970, 0.132 ppm on soil treated in 1969, and 0.038 ppm on that treated in 1968. Residues in beans from the upper half of the plant were one-fourth to one-half as great. A single application of heptachlor in 1969 resulted in residues of 0.02 ppm heptachlor and 0.07 ppm heptachlor epoxide in the beans. These results generally confirm the previous finding that soybeans should not be grown for at least two years on plots previously treated with dieldrin.

72-1175. Zitko, V.; Choi, P. M. K. (Fisheries Research Board of Canada, Biological Station, St. Andrews, N. B., Canada). **PCB and *p,p'*-DDE in eggs of cormorants, gulls, and ducks from the Bay of Fundy, Canada.** *Bull. Environ. Contam. Toxicol. 7(1): 63-64; 1972.* (6 references)

Eggs of black ducks (*Anas rubripes*), double-crested cormorants (*Phalacrocorax auritus*) and herring gulls (*Larus argentatus*) from The Wolves, Bay of Fundy and Passamaquoddy Bay, New Brunswick contained high levels of polychlorinated biphenyls (PCBs) and *p,p'*-DDE relative to literature values for eggs from other locations. The highest average concentration of PCB, which was quantified using five of the six major peaks of Aroclor 1254, was 43.5 μg/g in cormorant eggs. Differences in feeding habits are probably responsible for lower levels of PCB in gulls and ducks. Levels of *p,p'*-DDE ranged from 1.50 to 29.4 μg/g.

72-1176. Anonymous. **Can foliage be used to monitor air pollution?** *Chem. Week 109(16): 61-62; 1971.*

The finding that many pollutants are absorbed by vegetation and soil has led to research in the use of plants as indicators of the presence of pollutants and in the capacity of soil to eliminate toxic materials. Once internal variables in plants that eventually lead to damage from pollutants are established, an excellent detector system, which operates night and day and responds to an interaction of parameters, could be devised. A magnetic constant, which requires no wiring, appears to be a good choice. Measurements in alfalfa have also shown that plants could be important receptacles for wastes such as hydrogen fluoride, sulfur dioxide, chlorine, nitrogen oxides and ozone. Aerobic microorganisms in soil seem to absorb tremendous quantities of carbon monoxide and perhaps ethylene, sulfur dioxide and nitrogen dioxide. It has been estimated that the soil surface of the continental U.S. could absorb over 600 million metric tons of carbon monoxide per year.

72-1177. Barchet, R.; Biermann, J.; Feucht, M.; Haag, T.; Jori, H.; Wilk, G. (Chemische Untersuchungsamt der Stadt Stuttgart, Germany). **Ergebnisse chemischer Untersuchungen zum Umweltschutz. [Results of chemical investigations on environmental protection.]** *Deut. Lebensm.-Rundsch. 68(3): 69-74; 1972.* (15 references) (German)

Some results of studies of food chemistry and human-body residues of various components conducted by the Stuttgart Chemical Investigation Bureau are presented. Lead, mercury and tin contents of food exceeded the permitted limits in many cases. High mercury, lead, cadmium and beryllium levels in human blood and urine were mainly found in connection with occupational exposure. The analysis of human abdominal fat samples from four pathological institutes in the lower Neckar River region revealed average total DDT residues of 2.4 ppm in persons 0 to 2 years of age, and 6.5 ppm in persons above 40 years of age, with an average, for these two groups (32 samples), of 4.9 ppm. This value is in good agreement with results previously reported for West Germany, slightly lower than other values reported for Europe, and appreciably lower than the values reported for East Germany, India and Israel. The methodology employed did not preclude the possibility of PCB contamination.

72-1178. Zamfir, G.; Nestase, V. (Medical Inst., Iasi, Rumania). **Zagryaznenie pityevykh vodoistochnikov tverdymi otbrosami. [Contamination of drinking water sources with solid refuse.]** *Gig. Sanit. 36(12): 80-81; 1971.* (Russian)

Cases of well, ground and river water contamination by pesticides and other chemicals in Rumania are reviewed. Nearly 100 wells in a floodplain were poisoned over two years by contaminated water discharged after washing dibutox (dinoseb) pesticide containers. Concentrations of 0.1 to 2.0 mg/l. were measured. The communal water supply of a city was poisoned by large amounts of organochlorine and organophosphorus pesticides (detox, duplitox, heklotox, aldrin, and ekatox) due to a violation of the rules of residue discharge. Organochlorine pesticide concentrations in the order of 10 mg/l. were measured in the water of a creek near a chemical plant. Massive fish deaths in pesticide contaminated creeks were reported.

72-1179. Rohrlich, M.; Meuser, F. (Bundesforschungsanstalt fuer Getreideverarbeitung, Berlin, Germany). **Gasfoermige Schaedlingsbekaempfungsmittel. Ihre Anwendung und Wirkung auf lagerndes Getreide. [Gaseous pesticides. Their application and effects on stored grain.]** *Gordian 71(1652): 172-174, 176; 1971.* (German)

This section of a review on grain fumigants (for conclusions, see abstract no. 72-1180) represents a general introduction to the subject of protection of stored grain and flour, and a summary of the properties, uses and effects of two fumigants, phosphine and methyl bromide. Phosphine is advantageously generated *in situ* when aluminum phosphide comes into contact with moisture in the air. Certain measures, such as residue sifting and aspiration prior to grain processing, will effectively remove most phosphine residues. If the treated grain is made into bread, the residue level will be further reduced during dough-making and baking, and bread quality is good. Methyl bromide has the advantages of penetrating stored materials rapidly and desorbing rapidly and thoroughly after fumigation. Due to the high toxicity of the free gas, gas masks must be worn during methyl bromide application and the silo or grain container tested carefully for leaks. Residues are difficult to detect.

72-1180. Rohrlich, M.; Meuser, F. (Bundesforschungsanstalt fuer Getreideverarbeitung, Berlin, Germany). **Gasfoermige Schaedlingsbekaempfungsmittel. Ihre Anwendung und Wirkung auf lagerndes Getreide. Schluss. [Gaseous pesticides. Their application and effects on stored grain. Conclusion.]** *Gordian 71(1653-1654): 221-223; 1971.* (78 references) (German)

The conclusion of this review on grain fumigants (for part 1, see abstract no. 72-1179) discusses hydrogen cyanide, then compares the properties of phosphine, methyl bromide and hydrogen cyanide. The toxic effects of hydrogen cyanide in both insects and warm-blooded animals depend on the reversible inhibition of the iron-containing respiratory enzymes, which are important in cellular respiration. However, its effects at sublethal concentrations are reversible. Granular calcium cyanide finds limited use as a grain fumigant in the United

States; in Germany, hydrogen cyanide is primarily used for the disinsection of mills and empty granaries, as well as the disinsection of ground products in closed systems. Operators must wear gas masks, and test strips must be used to check for cyanide in the atmosphere outside the storeroom. Some hydrogen cyanide may react with gluten and thus be retained in flour or bread made from treated grain; however, such residues are not toxicologically significant, since they are rapidly converted to thiocyanite in animal tissue. Considering the available knowledge, phosphine is the preferred fumigant for grain and ground products due to its low residue levels and lack of harmful effects on grain quality, whereas methyl bromide and hydrogen cyanide are primarily suitable for rapid disinsection of storage areas.

72-1181. Pesticide Research Center (Michigan State U., East Lansing, MI 48823). **Pesticides in the soil. ecology, degradation & movement.** *Int. Symp. Pestic. Soil, Mich. State Univ., Feb. 25-27; 1970. 144 p.* (935 references)

The Symposium, with program participants from the United States and four foreign countries, was convened during the dedication of the Pesticide Research Center, and was intended to foster an interdisciplinary approach to the problems of pesticides in soil. The topics discussed by the participants included the roles of microflora and fauna in soil systems and new techniques for investigating them; effects of pesticides on soil-associated organisms; pesticide degradation, movement and metabolism in soil; toxicity of pesticide metabolites; effects of soil type on herbicide activity; and nutrient cycling implications of pesticides.

72-1182. Muench, W. D. (Braunschweig, Germany). **Die Abteilung fuer Pflanzenschutzmittel und -Geraete der BBA gibt bekannt: Die Anwendung von Pflanzenschutzmitteln in Wasserschutzgebieten. [The Plant Protection Chemicals and Apparatus Section of the BBA announces: The use of plant protection agents in water conservation areas.]** *Nachrichtenbl. Deut. Pflanzenschutzdienstes 23(9): 141-142; 1971.* (German)

Although many areas have recently been designated as water conservation regions in Germany, and although these regions contain many acres of forested land, no regulations governing the application of pesticides in such areas have been promulgated. The only guidelines available are those of the German Gas and Water Association, which divide the water conservation areas into the actual river, lake or reservoir area, the concentrated conservation zone and the peripheral conservation zone. Substances which are potentially dangerous to health should not be applied in the inner zone, and may only be used with the appropriate precautions in the two outer areas. The BBA (Biologische Bundesanstalt, West German Biological Institute) lists 19 specific compounds and two compound classes which present little threat of groundwater contamination, as long as local conditions are properly accounted for. The compounds include herbicides, specifically the triazines; certain organochlorine and organophosphate insecticides; simple substances such as sulfur and mineral oil; and wildlife repellents, with the exception of those containing technical Hexa.

72-1183. Bjerk, J. E. (Institutt for farmakologi og toksikologi, Norges Veterinaerhoegskole, Oslo, Norway). **Rester av klorinsekticider i norskproduserte hoenseegg i 1970. [Residues of organochlorine insecticides in hens' eggs produced in Norway, 1970.]** *Nord. Veterinaermed. 23: 288-292; 1971.* (8 references) (Norwegian)

The organochlorine pesticide content of 116 eggs, comprising 12 samples from 6 areas in Norway, were determined as part of a study on the pesticide content of the human diet. No organochlorine pesticides or polychlorinated biphenyls were found except for DDT and its derivatives, although up to 0.1 ppm of lindane could have been masked in this analytical procedure. Total DDT levels ranged from 0.009 to 0.045 ppm; residue contents of more than 0.01 ppm were found in 60 of the eggs. Since the majority of farmers used commercial feed mixtures rather than local grains, the organochlorine compound contents of the eggs depended on the DDT content of the feeds rather than on the eggs' site of origin. Thus the organochlorine residue contents of Norwegian eggs are low, both in relation to the international standards and in comparison to values reported in other countries.

72-1184. Bjerk, J. E.; Sundby, R. (Norges Veterinaerhoegskole, Oslo, Norway). **Rester av klorinsekticider og polyklorerte bifenyler i testorganismer fra jord og vann. Norsk del av OECD-program 1967-68. [Residues of organochlorine insecticides and polychlorinated biphenyls in terrestrial and aquatic test organisms. Norwegian part of OECD program 1967-68.]** *Nor. Vet.-Tidsskr. 82: 241-246; 1970.* (4 references) (Norwegian)

As part of the research effort initiated by the Committee for Research Cooperation of the OECD to study pesticide residues in nature, 80 wildlife samples were collected in Norway and analyzed for organochlorine compounds. Ten dogfish (*Squalus acanthias*) were collected in western Norway, 23 starlings (*Sturnus vulgaris*) in central Norway, 10 pikes (*Esox lucius*) and 10 mussels (*Mytilus edulis*) from southeastern Norway and another 14 mussels from the far north of Norway. The findings were as follows: dogfish lateral muscle, 0.2 ppm DDT + metabolites, 0.02 ppm dieldrin and 0.03 ppm PCB; starling breast muscle, 0.08 ppm DDE, 0.037 ppm dieldrin and 0.014 ppm PCB-10; pike lateral muscle, 0.016 ppm DDT + metabolites and 0.04 ppm PCB-10; soft tissue of mussels from Oslo, 0.008 ppm DDT + metabolites and 0.002 ppm dieldrin; mussels from northern Norway, DDE and PCB 0.005 ppm each. These

values were similar to those obtained in preliminary studies in 1966-1967.

72-1185. Listopadova, E.; Horak, E. (Krajska Hygienicka Stanice, Ostrava, Czechoslovakia). **Rezidua metylbromidu v olejninach. [Methyl bromide residues in oil-bearing seeds.]** *Prum. Potravin 23(2): 40-43; 1972.* (14 references) (Czech)

Methyl bromide residues were determined following fumigation of sea kale seeds, poppyseeds, sunflower seeds, rapeseeds and shelled and unshelled peanuts by exposure to 30 g/m^2 of methyl bromide for 48 hr at 16°C, relative humidity 74.3%. Levels of 5 to 30 ppm were found in the seeds immediately after fumigation. These residue levels were not reduced by storage for 20 days at 19°C and a relative humidity of 51% or by heating to 85°C for 10 to 20 min. However, the oils pressed from the treated oil-bearing seeds contained only negligible quantities (0.3 to 3 ppm) of methyl bromide, which had no deleterious effect on their organoleptic qualities. Most of the bromine in the seeds was in inorganic form.

72-1186. Haan, C. T. (Agricultural Engineering Dept., U. of Kentucky, Lexington, KY). **Movement of pesticides by runoff and erosion.** *Trans. Amer. Soc. Agr. Eng. 14(3): 445-447, 449; 1971.* (7 references)

Results of controlled field experiments on the movement of aldrin, dieldrin and DDT confirmed the opinion that water pollution from these chemicals can be greatly reduced by curbing sediment losses from agricultural areas. Plots were sprayed at a rate of 1.5 lb/acre and water was applied until approximately 1.7 in. of runoff had occurred. Concentrations of pesticides, determined by gas chromatography, were 10 to 30 ppm in eroded soil and only 1 to 70 ppb in runoff water. The sediment carried away more than twice as much chemical as the water. Runoff concentrations were not greatly affected by the time lapse between application and precipitation.

72-1187. Seidensticker, IV, J. C.; Reynolds, III, H. V. (Idaho Cooperative Wildlife Research Unit, U. of Idaho, Moscow, ID 83843). **The nesting, reproductive performance, and chlorinated hydrocarbon residues in the red-tailed hawk and great horned owl in south-central Montana.** *Wilson Bull. 83(4): 408-418; 1971.* (23 references)

DDE, DDT, DDD (TDE) and dieldrin were found in measurable but low levels in all tissue and eggs analyzed from red-tailed hawks and great horned owls in south-central Montana. Levels of DDE were the highest. Heptachlor epoxide was found in some samples, and polychlorinated biphenyls were present in the one hawk and one owl egg analyzed. Breeding seasons in 1967 were 105 days for the hawk and 125 days for the owl. The 50% nesting success observed for the red-tailed hawk is not sufficient to maintain a stable population. The 64% nesting success of the great horned owl is probably adequate since the mortality rate is lower for the owl. In the case of the hawks, the average clutch size was 2.9 and the average number fledged from successful nests was 1.7. The corresponding numbers for the owl were 2.2 and 1.8. Eggshells of the hawk decreased in thickness pre-1947 values, while a slight increase in thickness of the eggshells was observed with the owl. Any variations observed in the hawk group could be explained by the migration of this bird and thus its less consistent habitat.

72-1188. McLeod, H. A.; Grant, D. L.; Phillips, W. E. J. (Research Labs., Food and Drug Directorate, Tunney's Pasture, Ottawa, Ontario, Canada). **Pesticide residues and metabolites in placentas.** *Can. J. Pub. Health 62: 341-344; 1971.* (13 references)

Human placentas from "normal births" were analyzed for organochlorine and organophosphorus pesticides by electron-capture gas-liquid chromatography. Residues of *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD (TDE), lindane, aldrin, and dieldrin were demonstrated by GLC but only *p,p'*-DDT and *p,p'*-DDE could be confirmed by thin-layer chromatography. A total of 116 response peaks were obtained from the organophosphorus and organosulfur detector, and none of these were due to 35 of the most common organophosphates and their metabolites.

72-1189. Tarrant, R. F.; Allard, J. (Pacific Northwest Forest and Range Experiment Station, PO Box 3141, Portland, OR 97208). **Arsenic levels in urine of forest workers applying silvicides.** *Arch. Environ. Health 24(4): 277-280; 1972.* (3 references)

Forest tree thinning workers absorb arsenic from silvicides. Much of the chemical appears to be excreted from the body in a short time. There appears to be no evidence of a continuing increase in arsenic levels over a period of more than two months. Persons using these materials should be trained to observe all necessary precautions to minimize their exposure. (Author abstract by permission).

72-1190. Parra, L. A. (West Virginia U., Morgantown, WV). **Fate of atrazine and paraquat in three West Virginia soils.** *Diss. Abstr. Int. 32(4): 1961-B; 1971.*

The effects of atrazine and paraquat on soil microorganisms, were tested separately and simultaneously, as were their absorption by plants, adsorption by soil, leaching and residue properties. Both chemical and bioassay methods were employed. Neither paraquat nor atrazine (nor the combination) was toxic to soil microorganisms, although paraquat apparently favored the growth of fungi at the expense of bacteria. Soil absorp-

tion of both herbicides increased with decreasing pH and with rising organic matter contents; the presence of paraquat decreased atrazine adsorption. Soil movement was found to be minimal. Good agreement was obtained between chemical analysis and bioassay results. (Author abstract by permission, copies of the thesis are available from University Microfilms, Order No. 72-26,640.)

72-1191. Schuphan, I.; Ballschmiter, K. (Institut fuer Anorganische Chemie und Kernchemie der Universitaet Mainz, Germany). **Zur Persistenz von Hexachlorbicyclo-(2.2.1)-hepten-Derivaten. [Persistence of hexachlorobicyclo-(2.2.1)-heptene derivatives.]** *Fresenius Z. Anal. Chem. 259(4): 25-28; 1972.* (11 references) (German)

The hexachlorobicycloheptene structure in the cyclodiene insecticides aldrin, dieldrin and endosulfan is highly resistant to chemical attack due to its steric arrangement. Previous metabolic studies had concentrated on derivatives in which this structure was retained. In the present studies, the splitting-off of chlorine under various physical, chemical and biological conditions was investigated by microtitration, and the formation of reaction products by gas chromatography. Microtitration was especially useful in the hydrolysis experiments; it revealed that aldrin and dieldrin are highly resistant to nucleophilic attack at 50°C in 4 *N* aqueous-methanolic potassium hydroxide, whereas the diol readily loses its chlorine. In contrast, the photochemical removal of chloride at 22°C in aqueous-methanolic solution is quite rapid for all compounds, and gas chromatography clearly reveals the formation of transformation products. Thus dechlorination of the hexachlorobicycloheptene structure in soil under the influence of pH, for example, seems rather unlikely, whereas photochemical dechlorination on leaf surface or in the atmosphere may well represent a significant degradation route.

72-1192. Watanabe, S. (Watanabe Clinic, Pesticide Poisoning Research Lab., Japan). **[Acute organophosphate poisoning detected in plasma, and its significance.]** *Igaku No Ayumi (Progr. Med.) 80(11): 696-697; 1972.* (16 references) (Japanese)

Numerous organophosphate poisoning cases have been found in the Aomori area where apples are one of the main agricultural products and pesticides are used abundantly. Organophosphate concentrations in plasma of 19 people poisoned with pesticides were determined by gas chromatography using a flame thermal ionization detector. Ten individuals not exposed to organophosphates served as a control group. Plasma was taken from the pesticide victims immediately after the diagnosis was made and that from the controls was taken before breakfast. The plasma from all of the exposed individuals contained, in varying degrees, one or more of the following pesticides: salithion, Sumithion (fenitrothion), malathion, and parathion. None of these compounds was detected in the control group.

72-1193. Ubertalle, A. (Universita di Bologna, Bologna, Italy). **Alimenti e pesticidi: livelli di tolleranza e metodi d'analisi. [Foods and pesticides: tolerance limits and analytical methods.]** *Ind. Aliment. (Pinerolo, Italy) 10(12): 90-94; 1971.* (1 reference) (Italian)

The chronic action of organochlorine residues on humans involves a wide range of enzyme systems, organs and tissues and thus constitutes a contributing factor to the public health hazard spectrum. According to recent data, animal fats, cheese products, eggs and fish, and milk contribute by 50, 16.5, 1.8, and 3.7% respectively while only 14.4% of the whole DDT ingested by man comes from vegetable foods. A survey performed last year in two provinces of Italy indicated that average heptachlor, dieldrin, and DDT residues found in milk exceed the maximum admissible limits established by FAO/WHO, while in meat only dieldrin exceeds such limits. Included are tables describing the recommendations made by FAO/WHO experts. Data are expressed as maximum acceptable daily ingestion in mg/kg body weight of pesticide, tolerance limits to be admitted in food in ppm, and as practical limits of pesticide residues (ppm) for animal food products. Studies on combined diets, recently performed in Canada, Great Britain, and the U.S. indicate that the daily intake of pesticide residues with any kind of food in the U. S. is below the levels recommended by international authorities. Included are discussions in analytical techniques, sampling and extraction methods and on the progress achieved in the enhanced sensitivity of the analytical methods applied in the monitoring of pesticide residues.

72-1194. Magness, J. R.; Markle, G. M.; Compton, C. C. (USDA, ARS, New Jersey Agricultural Experiment Station, New Brunswick, NJ 08903). **Food and Feed Crops of the United States.** *N. J. Agr. Exp. Sta. Bull. 823, June 1971. 255 p.* (30 references)

This publication is subtitled "A descriptive list classified according to potentials for pesticide residues"; as the Foreword explains, it is the first attempt to classify all commercial food and feed crops in the United States from the standpoint of degree of susceptibility to possible contamination as a result of exposure to pesticides. The list is primarily intended to be useful in establishing pesticide tolerances and in the approval of pesticide labeling requirements. As explained by the coordinator of the Interregional Research Project out of which this list was conceived, the traditional method of classifying plants according to botanical relationships does not always aid in determining their relationships to pesticide residues, as the parts of the plants exposed to contamination and used as food or feed may vary widely among close biological relatives. The major classifications of vegetable crops, fruit crops, nut crops, stimulant crops, food oil crops, spice crops, grass crops, legume crops, grain crops and sugar and syrup crops are further broken down according to location of edible parts in relation to pesticide-treated portions. For each plant, the

entry includes alternate (common and systematic) names, description, season, production figures, use, part of plant consumed, and class.

72-1195. Kuwahara, Y.; Koga, Y.; Yamaguchi, S.; Matsumoto, H.; Matsuo, S.; Kaku, S.; Tateishi, M.; Shiramizu, M.; Ide, I.; Goto, K.; Karatsu, M.; Hinagata, K. (Sch. of Medicine, Kurume U., Kurume, Japan). **[Epidemiological study of pesticide pollution. I. Organochlorine pollution.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 27(1): 103; 1972.* (Japanese)

An epidemiological survey of the extent of pesticide pollution was conducted with over 1000 people as test subjects. Plasma samples were taken from workers in organochlorine manufacturing plants, women engaged in farming, and ordinary non-agricultural urban dwellers. Electron-capture gas chromatography was used for analyses. β-BHC, DDT, DDE, and dieldrin were measured, but the last item was disregarded because it was only present in trace amounts. The concentration of β-BHC was much higher among the control group of city dwellers than among the women of agricultural villages. This indicated that the chemical residue in food was considerably more significant than contact during farming. On the other hand, the plasma samples of BHC manufacturing workers showed a significantly higher concentration than any other group. With regards to DDT, an evaluation was difficult since it had been some time since the legal prohibition of the use of DDT. The plasma of the women of agricultural villages seemed to show a higher concentration than that of the other two groups. However, no significant difference was noted between those women who had used DDT in the past and those who had never come into contact with it during farming.

72-1196. Carrasco, J. M.; Cunat, P.; Martinez, M.; Primo, E.; Alberola, J. (Inst. Agroquimica y Tecnologia de Alimentos y Catedra de Quimica Agricola de la Escuela Tecnica Superior de Ingenieros Agronomos de Valencia, Spain). **Contaminacion de productos agricolas por plaguicidas. IV. Nivel de contaminacion de frutas y hortalizas del mercado. [Contamination of agricultural products with pesticides. IV. Contamination levels of fruits and vegetables.]** *Rev. Agroquim. Tecnol. Aliment. 11(2): 236-248; 1971.* (14 references) (Spanish)

Fresh fruit and vegetable samples were taken from five markets in Valencia which were known to be supplied from areas with high pesticide consumption rates for analysis of insecticide and fungicide residues. No trace of contamination was found in 30% of the lettuce, 20% of the peaches, 35% of the apples, and 40% of the oranges. Contamination levels of DDT, DDE, or BHC ranges from 0.001 to 0.05 ppm, and the percentage of DDT or BHC contaminated samples was 35.0 and 52.8 respectively. Of the 140 samples analyzed, only one contained 0.1 ppm of *p,p'*-DDT, which was in excess of the usual range of residue levels. Organophosphate insecticides such as parathion and malathion reached 0.03 ppm in pears and apples but were not found in peaches and oranges. Dithiocarbamate fungicide residues averaged 0.5 to 1.0 ppm in 10% of the lettuce samples, 15% of the peaches, and in 20% of the apples. Contamination with acaricides varied between 0.005 and 0.2 ppm in apples. The overall results indicated all pesticide residues to be below the upper tolerance limits established by FAO.

72-1197. Matsushima, S. (Saku General Hosp., Saku, Nagano Pref., Japan). **[Pollution of food by agricultural chemicals and the diet.]** *Rinsho Eiyo (J. Clin. Nutr.) 40(5): 555-563; 1972.* (6 references) (Japanese)

Analysis of the total diet of an ordinary citizen of Matsuyama city revealed that the average daily intake of BHC is 0.177 mg/day/adult. The major portion of BHC is present as the β-isomer, the chronic toxicity of which is five times greater than that of γ-BHC (lindane). Sixty per cent of the total BHC intake comes from meat and dairy products; however, 90% of the β-BHC comes from these foods. The daily diet of patients at Saku General Hospital contained, on the average, 0.0448 mg of BHC. The average β-BHC content in mother's milk is highest in the Nagasaki area (1.288 ppm) as compared with the average for all Japan (0.120 ppm). The average six-month-old baby in Nagasaki, consuming 1 l./day of milk, is therefore ingesting 1.288 mg/day of β-BHC. A temporary ADI of 0.035 mg for a 7-kg baby has been established; however, an international standard ADI for this compound has not been determined.

72-1198. Imoto, T.; Yamaguchi, H.; Shigenaga, A. (Saga Pref. Health Research Inst., Japan). **[Residual agricultural chemicals in food.]** *Saga-ken Eisei Kenkyusho-ho (Rep. Saga Prefect. Inst. Pub. Health) 9: 141-146; 1971.* (Japanese)

When total BHC and DDT residues in mothers' milk were examined in March 1971 throughout Japan, those from the mothers in Saga Prefecture showed the highest average. The results of measuring chemical residues in various specimens of grapes, tomatoes, apples, cucumbers, cabbages, potatoes, and pears conducted between 1969 and 1970 indicated that no residues exceeded the maximum permissible content. Analyses were performed for γ-BHC (lindane), DDT, parathion, lead, and arsenic. In October 1971, chemical residue contents were examined with regards to the total diet. BHC, DDT, DDE, DDD (TDE), aldrin, endrin, and dieldrin residues were measured in 100 gram of each food item. The results are presented in tables.

72-1199. Uyeta, M.; Taue, S.; Chikazawa, K.; Nishimoto, T. (Kochi Pref. Pub. Health Lab., 5 Marunouchi, Kochi, Japan). **[Pesticides translocated in food—organochlorine pesticides in the total diet.]** *Shokuhin*

Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 12(6): 445-450; 1971. (12 references) (Japanese)

A daily total diet for a normal adult containing 77.9 g of protein, 49.7 g fat, and 2177 cal was calculated for a 10-day period. The organochlorine pesticide (BHC, DDT, and dieldrin) content was then determined in various food groups such as cereals, meats, fats, fruits and preserves, root vegetables, green vegetables, and milk. The food was mainly purchased at a supermarket in Kochi City. The meats, fats, and milk were found to contain the highest amounts of organochlorines. The average daily BHC intake was 67 μg, of which 66% was β-BHC; this is far higher than the average daily intake in the U.S. or U.K. The average daily total DDT content of the diet was 23 μg/day, of which DDE accounted for 7 μg, DDE for 2 μg, and DDT the remainder. Although the average daily dieldrin intake of 4.80 μg/day in Kochi still falls within the provisional ADI (acceptable daily intake) range, it is considerably higher than that from other countries. Mother's milk containing 0.005 ppm dieldrin would introduce approximately eight times the ADI to a baby's body over a period of several months. These findings indicate the necessity of reducing pesticide residues in foods.

72-1200. Research Unit on Mercury. (Centraal Laboratorium TNO, Postbus 217, Delft, The Netherlands). **Kwik in het Nederlandse milieu. [Mercury and its compounds in the Dutch environment.]** *TNO Nieuws 26: 371-424; 1971.* (49 references) (Dutch)

This entire issue of *TNO Nieuws* comprises the first report of the Research Unit on Mercury, a part of the TNO Committee for Research on Side-effects of Pesticides and Related Compounds. A single summary, in English and Dutch, covers the fourteen articles in this issue, and a combined bibliography for the issue is given. Much of the mercury in the Dutch environment enters by way of the rivers, accumulating in the river sediments, which may become exposed as the rivers shrink in the summer. However, tissue samples from cattle grazing in such an area, flooded in winter but exposed in summer, did not contain substantially more mercury than samples from cattle from an area where flooding does not occur. Other topics discussed include transport of mercury and its compounds in soil, mercury contents of marine and freshwater fishes, danger of drinking-water contamination by mercury, mercury in the littoral environment, mercury contents in feathers and tissues of birds, and analytical techniques for mercury in the environment.

72-1201. Kan, T.; Harada, H.; Ito, K.; Yamazoe, R.; Totani, T. (Dept. of Microanalysis, Tokyo Metropolitan Research Lab. of Public Health, Tokyo, Japan). **[Residual levels of chlorinated hydrocarbon pesticides in cigarette and in its smoke.]** *Tokyo Toritsu Eisei Kenkyusho Kenkyu Nenpo (Annu. Rep. Tokyo Metrop. Res. Lab. Pub. Health) (22): 167-176; 1971.* (4 references) (Japanese)

Tobacco and smoke samples from seventeen brands of Japanese cigarettes and 20 foreign brands were examined for chlorinated hydrocarbon residues by the AOAC method, using a smoking machine to produce the smoke. The mean total DDT content of Japanese cigarettes was 131.1 μg/pack (20 cigarettes), and *p,p'*-DDT 79.2 μg; total DDT in foreign cigarettes 305.1 μg, *p,p'*-DDT 104.3 μg; in smoke from Japanese cigarettes, *p,p'*-DDT 1.09 mg/m^3, from foreign cigarettes 1.28 mg/m^3. Thus 6 Japanese cigarette brands had *p,p'*-DDT contents in the smoke above the allowed level of 1 mg/m^3, as did 16 foreign brands. The mean total BHC content in Japanese cigarettes was 2.06 μg/pack, and in smoke, 0.09 mg/m^3, of which γ-BHC (lindane) accounted for one-fourth to one-tenth. In foreign cigarettes, the total BHC content was 1.09 μg/pack and in their smoke, 0.03 mg/m^3, of which γ-BHC made up about three-fourths. Some of the insecticides were apparently retained by the filter, since the insecticide contents of the smoke from filter-tip cigarettes were lower than those without filters.

72-1202. Doguchi, M.; Ushio, F.; Niwayama, K.; Nishida, K. (Dept. of Nutrition, Tokyo Metropolitan Research Lab. of Public Health, Tokyo, Japan). **[Pesticide content of human female fat in a metropolitan area.]** *Tokyo-Toritsu Eisei Kenkyusho Kenky Nenpo (Ann. Rep. Tokyo Metrop. Res. Lab. Pub. Health) (22): 131-133; 1971.* (14 references) (Japanese)

Abdominal fat samples from 21 women living in metropolitan Tokyo were analyzed for pesticide content by the ADAC method using gas chromatography. The following averages were found: 0.14 ppm α-BHC; 2.92 ppm β-BHC; 0.13 ppm γ-BHC; 2.35 ppm *p,p'*-DDE; 0.96 ppm *p,p'*-DDT; 0.11 ppm *o,p'*-DDT; 0.33 ppm dieldrin and 0.04 ppm heptachlor epoxide. These values were appreciably below those recorded in Japan in previous years but still higher than some comparison values from other countries.

72-1203. Kasimov, T. (Dushanbe Inst. of Epidemiology and Hygiene, Dushanbe, USSR). **Zagryaznennost' vozdukha pestitsidami v period ikh primeneniya v sel'skom khozyaystve. [Air pollution from pesticides occurring during their agricultural application.]** *Zdravookhr. Turkm. 15(4): 11-13; 1971.* (4 references) (Russian)

Air pollution from organophosphorus (methylmercaptophos and intration [thiometon]) and organochlorine (DDT and BHC) pesticides during the season of their application by aircraft spraying to cotton crops was studied. Between 1966 and 1968, 1400 air samples were collected. Organophosphorus compound vapors appeared to persist for 8 days within a 1000 m radius of the treated area; their concentration in the air samples

exceeded 2 to 26 times their MAC during the first six days following application. Organochlorine pesticide vapors persisted for six days and maximum DDT concentrations (ten times the MAC) were found within a 300 m radius. Indoor pollution in homes located at about the same distance away was found to exceed twice the MAC for DDT. Maximum DDT concentrations were found during the hot hours of the day (from noon until 4 P.M.). The 300 m radius of the sanitary protection zone should be extended to 1000 m because of the indoor and outdoor pollution data, and limitations should be applied to the procedure of aircraft spraying.

72-1204. Chapman, A. H.; Price, J. W. (Tin Research Inst., Fraser Rd., Greenforn, Middx., England). **Degradation of triphenyltin acetate by ultra-violet light.** *Int. Pest Contr. 14(1): 11-12; 1972.* (10 references)

Triphenyltin, as a thin layer on a glass plate, was shown to readily degrade to inorganic tin in the presence of UV light in the laboratory. The degradation products, diphenyl and monophenyltin and inorganic tin, were separated from the triphenyltin by paper chromatography. The rate of breakdown, which was faster at lower wavelengths and independent of layer thickness (5 to 10 μ), was similar for the intermediates and the parent compound. About 10% of the triphenyltin remained, and elemental analysis suggested that the degradation products were present as the hydroxides or hydrated oxides, following irradiation for 60 hrs under the following conditions: wavelengths above 235 nm; intensity of 12 mW/cm^2 and 720 mW, hr.

See also 72-1128, 72-1130, 72-1133, 72-1139, 72-1140, 72-1144, 72-1145, 72-1149, 72-1152, 72-1161, 72-1208, 72-1209, 72-1226, 72-1228, 72-1232, 72-1234, 72-1246, 72-1265, 72-1278, 72-1282, 72-1296, 72-1327, 72-1328, 72-1333, 72-1334, 72-1338, 72-1339, 72-1348, 72-1349

72-1205. Chadli, A.; Kchouk, M.; Dvoracek, G. (Author address not given). **Etude morphologique de l'intoxication au parathion. [Morphological study of poisonings due to parathion.]** *Arch. Inst. Pasteur Tunis 47(1-2): 89-102; 1970.* (20 references) (French)

Investigations of 200 lethal parathion poisonings were reviewed. Over a period of 13 years, poisonings due to organophosphorus pesticides, particularly parathion, accounted for 68% (345 cases) of all poisonings due to chemicals. Principal symptoms included miosis, visceral edemas and congestion, vomiting, dyspnea, hypersecretion, and cyanosis of ears and fingers. Enlarged lung, acute emphysema, pulmonary edema, pink foam in trachea and bronchi, and hemorrhages in digestive organs were found at autopsy. Vascular stasis with considerable edemas in both encephalon and meninges was detected, and histological investigations revealed steatosis in liver and lymphocytic infiltration. The brain and cortex cytoplasms contained no Nissl bodies. Other findings included intense congestion with excessive secretion and canal break in pancreas, and dilation of the glomerular capillaries in the kidney. Therapy was generally based on atropine at 5 mg every 30 min until miosis disappeared, and α-pyridylaldoxime injections of 800 mg.

72-1206. Matsushima, S. (Inst. of Rural Medicine, Usuda-machi, Nagano Pref., Japan). **[Clinical aspects of chronic poisoning by organophosphorus pesticides.]** *Baioteku (Biotech) 3(4): 258-262; 1972.* (24 references) (Japanese)

Since the use of organochlorine insecticides such as DDT and BHC has been restricted in Japan, the organophosphate and carbamate insecticides are now used in large quantities. Due to their reportedly rapid degradation, it has been assumed that they do not accumulate in crops and animal tissues, and that the only threat is offered by their acute toxicity, except for possible delayed-acute neuropathies. Chronic polyneuropathy has recently been reported as a result of occupational exposure to fenitrothion, diazinon and dichlorvos. The possible occurrence of eye disease due to chronic ogranophosphate exposure, as reported by Ishikawa (see Abstract No. 72-1207) and Ohto (see Abstract No. 72-0773) should be noted. Although neurological damage in such syndromes is reversible in mild cases, severe intoxications produce lasting damage. The ability of organophosphates to cause delayed neurotoxicity does not parallel their acute toxicity. More thorough monitoring of pesticide manufacturing workers and farmers is advised, along with more consistent application of the appropriate safety principles.

72-1207. Ishikawa, T. (School of Ophthalmology, Faculty of Medicine, Kitasato U., Mokadai, Sagamihara-shi, Kanagawa Pref., Japan). **[Eye diseases due to organophosphate pesticides.]** *Baioteku (Biotech) 3(4): 263-267; 1972.* (11 references) (Japanese)

A 67-year-old patient presented subjective symptoms of eye irritation, abdominal pain, headaches, perspiration, nausea, and numbness in the lower extremities since 1966. He also complained of a gradual deterioration of vision and an examination revealed loss and narrowing of vision, anomalous eye movements, and irregular pupil sizes. Red cell cholinesterase was appreciably reduced. Administration of vitamins and steroids had no effect. It was subsequently discovered that he had sprayed the pine trees in his garden approximately 50 times per summer since 1963 with a solution containing malathion or fenitrothion and malathion. After treatment with PAM in October 1971, vision in both eyes returned to normal and the other subjective symptoms disappeared. Based on this case study, preliminary experiments were conducted on dogs using the low-toxicity organophosphate thiometon. Chronic administration of 0.8 to 1.0 mg/kg per day resulted in miosis, mydriasis, exophthalmos, optic nerve atrophy, myopia, vascular dilatation and a 50% reduction in red cell cholinesterase. These findings are viewed as confirmatory evidence that the observed syndrome is due to organophosphate poisoning and not to the ingestion of formalin from defective plastic dinnerware.

72-1208. Watanobe, S. (Watanobe Hospital of Internal Medicine, Itayanagi-mach, Aomori Pref., Japan). **[Poisoning by parathion used in apple orchards.]** *Baioteku (Biotech) 3(4): 268-274; 1972.* (Japanese)

Parathion has been widely used in Japan since its introduction in 1951, especially in apple orchards of the northeastern region, including Aomori prefecture, where it was applied as many as 15 times in one season. The manufacture and sale of parathion in Japan were prohibited in 1969. The author has analyzed 200 of the 500 parathion poisoning cases, mostly the direct result of apple orchard spraying, in which he was consulted since 1953. The symptoms generally followed the classical pattern for organophosphorus poisoning. Persons between 30 and 40 years of age were most frequently involved, and the most severe cases were found among pesticide spray operators. The urinary *p*-nitrophenol level remained at 3 ppm in operator-farmers and 2 ppm in operators' assistants for about two weeks after spraying. Urinary *p*-nitrophenol levels of about 0.6 ppm were found in boys attending schools in parathion-polluted areas. Disease syndromes observed subsequent to parathion poisoning included 450 cases of "a feeling of heaviness of the head", 245 cases of hypertension, 250 instances of gastrointestinal disturbance, 145 cases of chronic hepatitis, 90 cases of bronchial asthma and 24 cases of cardiac disorders of pulmonary origin. The use of reasonable preventive measures could have forestalled most of the occurrences of parathion poisoning.

72-1209. Macklin, A. W.; Ribelin, W. E. (Wellcome Research Labs., Research Triangle Park, NC 27709). **The**

relation of pesticides to abortion in dairy cattle. *J. Amer. Vet. Med. Ass. 159(12): 1743-1748; 1971.* (21 references)

As part of a survey to determine causes of abortion in Wisconsin dairy cattle, the role of pesticides was examined. Of 31 abortion fetuses examined, 17 contained traces of three pesticides: dieldrin, DDT, or heptachlor epoxide. When compared with residues in nonaborted fetuses, the amounts found were insignificant. Carbamates or organic phosphates were not detected. Feeding of Ciodrin (crotoxyphos), diazinon, methoxychlor, carbaryl, or dichlorvos to pregnant cattle failed to cause abortion. Investigation of 6 dairy operations having milk withheld from commerce because of pesticide (aldrin, lindane) contamination failed to reveal any abortions. It was concluded that pesticides do not contribute significantly to the incidence of abortion on Wisconsin dairy farms. (Author abstract by permission.)

72-1210. De Ninno, F.; Pennino, G.; Celentano, V. (Ospedale Generale Provinciale "G. Rummo", Benevento, Italy). **L'intossicazione acute nell'infanzia. Relazione sui casi giunti alla nostra osservazione in quest'ultimo anno. [Acute poisoning in childhood. Report of cases observed during the last year.]** *Minerva Anestesiol. 37: 327-331; 1971.* (14 references) (Italian)

Of the 40 cases of acute accidental poisoning recorded among children through 12-yr-of-age in the past year, five were due to organophosphorus compounds and four were due to DDT. Two children died from organophosphorus insecticide poisoning. The clinical picture included muscarine-like symptoms such as nausea, vomiting, perspiration, diarrhea, and bradycardia, and nicotine-like symptoms. Atropine was used to inhibit acetylcholine accumulation and to alleviate the muscarinic symptoms. PAM (Pyridine-2-aldoxime methyl iodide) and Contrathion (Pralidoxime-methyl sulfate) were used as specific antidotes. These compounds promote the reactivation of serum and erythrocyte cholinesterase by forming complexes with the organophosphates. Symptomatic treatment was applied to children with organochlorine insecticide poisoning, for want of a known specific antidote.

72-1211. Conseil International de la Chasse (Author address not given). **Pesticides agricoles et protection du gibier. [Agricultural pesticides and game protection.]** *Phytoma 232: 33-35; 1971.* (French)

A report prepared by a working group of the International Hunting Council in connection with the 7th International Congress on Plant Protection and published in the Bulletin d'Information du Ministiere de l'Agriculture is reprinted here. The possibility of game being poisoned by agricultural chemicals applied to fields in the vicinity of wildlife habitations should be taken into account in selecting the chemical used, formulation type, and application conditions. The immediate risk of a given chemical or formulation to game animals can be evaluated theoretically on the basis of the toxicity and concentration of the pesticide active ingredient, or empirically, based on previous experience. The long-term risk depends on the pesticide residues retained by the game animals or by their food sources, and additional studies in this area are required.

72-1212. Ozawa, T.; Takase, M.; Manabe, Y. (Dept. of Ophthalmology, Tokyo Communications Hospital, Tokyo, Japan). **[Three cases of ophthalmological disorders possibly induced by organic phosphorus insecticides.]** *Teishin Igaku (Med. J. Commun.) 24(1): 27-29, 1972.* (4 references) (Japanese)

Three cases which indicated visual damages due to organophosphates are presented. In all three cases, a deterioration of vision and a strong astigmatism were noted. The first case was an 18-year-old student of an agricultural high school, who had come in contact with parathion and EPN (fenitrothion). He had a 0.8 vision on the right eye and a 0.1 vision on the left and the left eye showed a strong astigmatism. The eyeground, eye pressure, and marginal vision were normal. The smooth pursuit movement was subnormal. 0.16 ppm of *p*-nitrophenol was detected in his urine. After being advised to avoid contact with pesticides, the patient's *p*-nitrophenol content in urine decreased drastically to 0.01 ppm in less than a month. Atropine eyedrops were given for three months and daily application of six pellets of Padrin (pyrodifenium bromide) were prescribed for one month. The vision of the left eye was recovered in seven months. The second case was a 10-year-old boy whose vision was 0.1 in the right and 0.7 in the left eye. The smooth pursuit movement of eye showed a clear staircase pattern. The *p*-nitrophenol content in urine was 0.06 ppm and approximately normal, but anomaly refraction, anomaly eye movement, narrowing of vision, and anomaly CCLF were noted. Organophosphate had been consumed through well water. After he stopped drinking the well water and took prescribed medication for about five months, his vision and CCLF returned to normal. The case of an eight-year-old girl showed no other symptoms except for a deterioration of vision and rather high *p*-nitrophenol content (0.10 ppm) in urine. Her younger brother, who was examined at the same time, had normal vision but an extraordinarily high *p*-nitrophenol content of 0.19 ppm.

72-1213. Zimin, V. B. (Author address not given). **K voprosu o vliyanii arboritsidov na poleznuyu faunu. [Effect of arboricides on useful fauna.]** *Udobr. Gerbits. Les. Khoz. Evr. Sev. SSSR 88: 92-97; 1971.* (14 references) (Russian)

The effects of 2,4-D on the useful fauna in a coniferous forest area of 120 ha were studied. The control of

foliage trees and shrubs caused many birds to leave their nests in the affected area. Nest counts revealed a drop in both the number of birds and the number of species. Compared to a control area, the number of mammals and carnivorous birds was reduced. Reduced hatching rate, underdeveloped embryos and increased mortality among the young was revealed. Both spermatogenesis and fertility were affected, and an underdeveloped upper jaw was observed in many bird embryos. Pesticide residues were revealed in tissues and eggs. Some of these phenomena may have been caused by the lack of food in the affected area. Species collecting food within a short distance of their nests were most severely affected.

72-1214. Fountain, J. E. (488 U.S. 90 East, Crestview, FL 32536). **Methocarbamol in the treatment of strychnine poisoning in dogs.** *Vet. Med. Small Anim. Clin. 65(7): 718-719; 1970.* (1 reference)

Methocarbamol, a skeletal muscle relaxant, has been used successfully in the author's practice for five years in the treatment of strychnine poisoning. Generally only two doses were required, averaging 67 and 41 mg/lb, and severity of the spasm, rather than weight of the animal, determined the amount required. Symptoms are controlled almost immediately and the undesirable effects of barbiturate treatment, toxicosis, and narcosis are absent.

72-1215. Jennings, D. S. (Market Weighton, England). **Warfarin poisoning in pigs.** *Vet. Rec. 90(4): 110; 1972.*

In a Letter-to-the-Editor, a veterinarian reports observations made during a post-mortem examination of four pigs. These pigs died within 24 hr of one another, one week after being confined with 20 others in a pen in which a small amount of diluted warfarin had been left. All four presented similar findings: impaired blood clotting; endocardial, myocardial and epicardial hemorrhages; and massive fibrinous pericardial hemorrhages. No other hemorrhages were visible. All of the pigs died suddenly; other pigs in the lot were not eating well, and had discoloration of ears and flanks. The post-mortem lesions were identical to those found in mulberry heart disease; since the low-dose warfarin intake was apparently responsible for these deaths, the author suggests that the involvement of blood-clotting inhibitors in other cases of mulberry heart disease should be considered.

72-1216. Schuettmann, W. (Deutsches Zentralinstitut fuer Arbeitsmedizin, Berlin-Karlshorst, German Democratic Republic). **Klinishe Beobachtungen zur chronischen toxizitaet der Chlorkohlenwasserstoff-pestizide. [Clinical observations on the chronic toxicity of organochlorine pesticides.]** *Z. Gesamte Hyg. 17: 12-18; 1972.* (33 references) (German)

Clinical observations of chronic damage from occupational exposure to organochlorine pesticides such as DDT and γ-HCH (lindane) are presented. The hematopoietic system, liver and nervous system appeared to constitute the main targets. Higher incidence of panmyelophthisis was attributed to lindane rather than to DDT. Pathogenesis of panmyelopathy was viewed in terms of both toxic and immunobiological mechanisms. Accumulation of organochlorines within the fatty portion of the bone marrow emphasized the toxic mechanism of myelopathy induction. Liver damage included steatosis and mesenchymal inflammation. Four of eight patients under observation developed cirrhosis within a few months of observation, while one patient died during a liver coma. The patient had been exposed occupationally only to lindane; *post mortem* levels of pesticide in fatty tissues and in the liver constituted 102 and 4.8 ppm respectively. Liver disease was prevalent among older workers. Polyneuritis was observed among young workers (in their early twenties) who had been exposed to lindane. Psychological disorders including anxiety, excessive irritability and sleep disturbances were observed along with the motor pathology, which first appeared two or three years following exposure to lindane.

72-1217. Dezoteux, H.; Vinceneux, P. (Hopital Averroes, Casablanca, Morocco). **Le poumon et les intoxications volontaires massives par organophosphores. [The lung and massive intentional poisoning due to organophosphorus pesticides.]** *Eur. J. Toxicol. 3: 320-321; 1970.* (French)

From 1963 to 1970, 195 cases of acute organophosphorus poisoning, caused mainly by massive, intentional intake, were recorded in Casablanca (Morocco). Findings from clinical practice, autopsy and animal tests are described. Respiratory failure close to asphyxia, cyanosis of face and limbs, dyspnea, abundant mucous secretion, bronchial constriction, lowered cholinesterase and hyperglycemia were typical symptoms. Asphyxia represented the immediate cause of death. Autopsy revealed pink foam in the respiratory system, and blackish blood in the enlarged violet lungs. Dilated wall capillaries with erythrodiapedesis was observed. Sero-albuminous exudate was found in the majority of the alveoli. Therapy based on atropine (administered in intravenous doses of 1 to 4 mg every 2 to 3 min), artificial respiration and pralidoxime in daily doses of 600 to 1200 mg, usually brought about rapid recovery without relapse. The mortality for organophosphorus pesticide poisonings was 12.3%.

72-1218. Mazzella di Bosco, M. (Istituto Nazionale per l'Assicurazione contro gli Infortuni sul Lavoro, Italy). **Su alcuni casi di intossicazione professionale da dinitrofenoli (binapacril, DNOC, karathane) in lavoratori dell'agricoltura. [Some cases of occupational poisoning**

with dinitrophenols (binapacryl, DNOC, Karathane) in agricultural workers.] *Eur. J. Toxicol. 3: 325-331; 1970.* (37 references) (Italian)

Four cases of acute poisoning with dinitrophenol derivatives after occupational exposure are presented. Two patients (including one diabetic) became ill while spraying tomato plants with binapacryl. Initial symptoms, including headache, nausea, vomiting, abdominal pain, diarrhea and breathing difficulties developed after 2 hr of working. Fever, weak pulse, and tremor were noted later. Treatment with analeptics and atropine brought considerable improvement in 24 hr, followed by full recovery 1 wk later. The third patient was exposed to Karathane (dinocap) during orchard spraying. Thirst, dyspnea, generalized pruritis and erythema led to a diagnosis of acute allergic dermatitis. Symptomatic treatment provided rapid improvement. Nine days later, vesicles appeared all over her body; cortisone treatment led to complete recovery in one month. The final case involved in 60-year-old man in whom an incident due to handling DNOC had a fatal outcome. The anamnesis included a myocardial infarction 6 yr before; autopsy revealed myocardial sclerosis, severe hepatosis and nephrosis not associated with the pesticide. TLC revealed traces of DNOC in organ extracts. Death was attributed to cardiocirculatory collapse, precipitated by DNOC poisoning.

72-1219. Tsachalinas, D.; Logaras, G.; Paradelis, A. (Dept. of Internal Medicine, State General Hospital of Katerini, Greece). **Observations on two hundred forty six cases of acute poisoning with parathion in Greece.** *Eur. J. Toxicol. 4: 46-49; 1971.* (2 references)

The treatment of 246 cases of acute parathion poisoning is outlined. All cases were given 1 to 5 mg of atropine sulfate intravenously, with repeated doses at 5, 10, 20, and 30 min. The severity of the case dictated the route and dose used at intervals of 30 or 60 min after initial treatment. The width of the pupil, respiration, moisture of the tongue or, if those were normal, hypertension were used as indicators of the patient's condition. It was found that recovery was hastened and the amount of atropine required was reduced in the 28 cases in which treatment included a combination of atropine and pralidoxime.

72-1220. Faff, J. (Inst. Exp. Pharmacol. Academy of Medicine, Warsaw, Poland). **Aktywnosc acetylocholinoesterazy w ostrych i przewleklych zatruciach inhibitorami fosforo-organicznymi. [Acute and chronic poisoning with organophosphorus enzyme inhibitors: acetylcholinesterase activity.]** *Pol. Tyg. Lek. 26(28): 1089-1090; 1971.* **(18 references) (Polish)**

Erythrocyte acetylcholinesterase and plasma cholinesterase levels after acute and chronic exposure to organophosphate compounds are discussed in terms of diagnostic utility as well as correlation with the functional condition of the peripheral nervous system. Inhibition of these enzymes constitutes a sensitive, specific biochemical indicator of the presence of organophosphate compounds in the body. A decrease in brain or muscle acetylcholinesterase to 30 to 50% of normal levels leads to severe synaptic disorders; a drop to 10% of normal may result in death. The penetration of organophosphates into the body depends on the administration route. The ability of the given compound to pass through the blood-brain barrier also affects the relationship between the degree of cholinesterase inhibition and the development of clinical symptoms. DFP and mipafox readily penetrate the blood-brain barrier. Determination of cholinesterase inhibition is often difficult due to the unavailability of normal values and to the broad range of physiological variation in these values.

72-1221. Faff, J. (Inst. of Experimental Pharmacology of the Medical Academy in Warsaw, Warsaw, Poland). **Odnowa acetylocholinoesterazy w okresie zdrowienia po zatruciu inhibitorami fosforoorganicznymi. [Restoration of acetylcholinesterase in the process of recovery after poisoning with phosphoroorganic poisons.]** *Pol. Tyg. Lek. 26(29): 1127-1129; 1971.* (18 references) (Polish)

Inhibition of acetylcholinesterase activity is a severe biochemical derangement caused by organophosphate poisons. A literature review is given on the process of restoration of cholinesterase and acetylcholinesterase activity during recovery both by spontaneous reactivation and by regeneration. Which of these processes dominates depends on the nature of the poison and the affected organ. The process of acetylcholinesterase restoration is slower than that of cholinesterase. Restoration of cholinesterase of blood plasma by regeneration is the fastest process, whereas activity of acetylcholinesterase of blood corpuscles and muscles returns much slower. The activity of acetylcholinesterase of the central nervous system takes place slower than with other tissues. During convalescence after organophosphate poisoning, the clinical phenomena disappear much faster than restoration of acetylcholinesterase activity occurs. The causes are discussed.

72-1222. Wanic, W.; Marciniak, J.; Sikorski, M.; Dabrowski, H. (Toxicological Center of the Industrial Polyclinic of the City and Province of Poznan, Poznan, Poland). **Przypadek smiertelnego zatrucia gramoksonem. [A case of lethal poisoning with Gramoxone.]** *Pol. Tyg. Lek. 26(30): 1166-1168; 1971.* (8 references) (Polish)

The symptoms, therapeutic attempts, and histological analysis in a case of fatal poisoning with Gramoxone (paraquat) are described. Three phases in the development of the poisoning are observed: 1) scalding of throat and esophagus accompanied by alimentary canal disturbances; 2) kidney damage manifested by kidney inefficiency; and 3) severe respiratory

system damage, especially to pulmonary tissue, which dominated the final stage of poisoning. Chances for successful treatment are not good once extensive damage of pulmonary tissue accompanied by respiratory system failure has occurred.

72-1223. Brzeski, Z.; Krupa, A.; Czuczwar, Z. (Provincial Toxicological Centre, Lublin Inst. of Forensic Medicine of Medical Academy, Lublin, Poland). **Smiertelne zatrucie herbicydem dwupirydylowym-gramoksomem. [Fatal poisoning with Gramoxone–a dipyridyl herbicide.]** *Pol. Tyg. Lek. 26(35): 1368-1369; 1971.* (11 references) (Polish)

A case of fatal poisoning by Gramoxone (1,1′-dimethyl-4,4′-dipyridyl chloride, paraquat), used in agriculture as herbicide, is described. Toxic effects of this chemical are not quite understood. Pathological changes in lungs, liver, kidney, and heart reflected severe toxicological damage. Most pronounced was intensification of pathological changes in lungs. All treatment attempts failed.

72-1224. Browne, T. D. (Imperial Chemical Industries Ltd., Mond Div., Pilkington-Sullivan Works, Widness, England). **Treatment of paraquat ingestion.** *Brit. Med. J. 3(5774): 580; 1971.* (1 reference)

In a Letter-to-the-Editor, the author notes that in animal studies, Fuller's Earth and bentonite were found to absorb paraquat sufficiently well to inhibit gastrointestinal absorption and prevent death if administered promptly. Kaolin, Decalso, and Amberlite were not effective. According to the author's experience, treatment of poisoning should include a liter of water mixed with 300 g of pure, sterilized, fine powder Fuller's Earth administered by stomach tube following gastric lavage. A simple test was devised which can detect paraquat levels as low as 1 ppm in urine and 10 ppm in stomach contents. Enough fresh 1% sodium dithionite in 0.1 *N* NaOH to produce alkalinity is added to 25 ml of urine, and NaOH is added to a second sample for a control. Paraquat produces an immediate color change to green-blue. Stomach contents require 1 *N* NaOH. If all tests are negative in the first 48 hr, the compound has not been absorbed in a quantity sufficient to produce systemic after effects. So far, Fuller's Earth has only been used by the author in cases of suspected mouth splash by paraquat liquor. Two patients of another physician in whom bentonite was used after ingestion of paraquat succumbed. However, neither of these patients was treated until 2 hr post ingestion.

72-1225. Colas, A. (Inst. National de Recherche Chimique Appliquee, France). **Pollution de l'eau par les pesticides. [Water pollution from pesticides.]** *Chim. Ind. Genie Chim. 104(13):1620-1630; 1971.* (5 references) (French)

Data on pesticide production and dangers to aquatic animals, man and mammals are reviewed. World pesticide sales reached $1.2 to 1.8 billion in 1967, with France and the U.S. accounting for 8% and over 40%, respectively. With a specific expenditure of 27.50 F/ha, France was the tenth largest pesticide consumer in Europe. Among insecticides, 600 t of aldrin, 750 t of lindane, and 600 t each of DDT and BHC were used in France. More than 200 different products, including nearly 100 insecticides, 40 fungicides and 60 herbicides, are authorized in France. While the direct dangers to the aquatic fauna are due to acute or chronic poisoning, the indirect dangers, especially to fish, are caused by the lack of food, as about 50% of all food (plankton, larvae, aquatic plants) are killed by pesticides. The toxicity of the pesticides in water is dependent on the species involved, the characteristics of the water such as temperature, pH, dissolved oxygen and carbon dioxide, and the formulation ingredients. Organochlorine insecticides were found to be much more toxic to fish than organophosphorus derivatives, and herbicides were found to be generally less toxic to crustacea than to fish. Organophosphorus pesticides possess much higher toxicity to mammals, including man, than organochlorine products. A comprehensive classification of pesticides and respective oral LD50 in the rat, as well as solubility values, are given.

72-1226. Koga, Y.; Yamaguchi, S.; Matsumoto, H.; Matsuo, S.; Kaku, S.; Tateishi, M.; Shiramizu, M.; Kuwahara, Y.; Ide, I.; Goto, K.; Karatsu, M.; Ninagata, K. (School of Medicine, Kurume U. Kurume, Japan). **[Epidemiological study of pesticide pollution. II. Cholinesterase activity.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 27(1): 109; 1972.* (Japanese)

The relationship between the use of various organic pesticide and cholinesterase activities in the members of farm families was examined by measuring ChE in various age groups of pesticide users and nonusers. ChE was measured by the Shibata-Takahashi method. Women in agricultural families were then examined: ChE, blood pressure, hemoglobin (by the cyanmethemoglobin method), and blood specific gravity were measured in those with subjective symptoms and those without any conscious symptoms. Subjective symptoms were rated by the degree of fatigue expressed by the women. In general, those who had used pesticides showed significantly lower ChE activities. Subjective symptoms did not necessarily correspond to significant differences in clinical findings. Those with low hemoglobin counts or low blood specific gravities showed lower ChE values. However, the low ChE in farm women may not be attributable solely to contact with pesticides, as malnutrition and poor working conditions may have contributed much to their anemic condition.

72-1227. Weintraub, M. I.; Ribner, J. A.; Gallagher, B. B. (31 Risley Rd., Chestnut Hill, MA 02167). **Transient internal ophthalmoplegia.** *Arch. Ophthalmol. 86: 595-598; 1971.* (10 references)

A 48-year-old housewife was hospitalized for evaluation of a syndrome consisting of blurred vision, skin rash, and incoordination. One week prior to admission, bilateral tinnitus and ear pain lasting 24 hr were noted, followed by recurrent episodes of skin rash upon exposure to cold, then by development of gait ataxia and nausea. Neurological findings upon admission were bilaterally large (5 to 6 mm) elliptical pupils, nonreactive to light and accommodation, which constricted promptly upon application of a 2.5% methacholine solution. An electroencephalogram contained marked low voltage, fast activity (beta) with sharp-spike components. Laboratory studies were generally normal, except for gas chromatography of the urine, which revealed a large number of unidentified peaks not found in control urine. These peaks closely resembled the peak pattern obtained when a sample of an insecticide used three weeks earlier by this patient was extracted from normal urine with acetone. However, the insecticide consisted of pyrethrum and piperonyl butoxide, whereas the peaks in the urine represented chlorinated cyclic and aromatic compounds. The syndrome gradually resolved, and was diagnosed as Adie's syndrome of unknown etiology.

72-1228. Paccagnella, B.; Ghezzo, F.; Prati, L.; Fedrazzoni, U.; Belloni, G. (Istituto di Igiene, Universita di Ferrara, Ferrara, Italy). **Epidemiological study of long-term effects of pesticides on human health.** *Bull. WHO 45(2): 181-199; 1971.* (17 references)

To assess the effects of differing levels of environmental contamination by pesticides on human health, pesticide residues and health parameters were examined in persons from two rural areas in Italy (designated as area A and area B). Area A had a history of extensive pesticide use for the past 15 years, whereas in area B pesticides have only been used for the past 10 years, and in modest quantities. Appreciable organochlorine contamination of water, agricultural products, and wildlife was demonstrated in area A, and less in area B; organophosphates and carbamates were not detected due to rapid degradation. Organochlorine contents of human adipose tissues from the two areas did not differ. A series of two examinations, including questioning regarding past and present symptomatology and pathology, of pesticide handlers and non-handlers in the two areas revealed a higher incidence of digestive, liver, and locomotor diseases in the population of area A than in area B, whereas no differences relating to occupational exposure were noted. The incidence of symptoms such as respiratory difficulty, anorexia, headache, anxiety, vomiting, asthenia, and excessive lacrimation was lower in area B. Differences in blood chemistry and enzyme values were probably attributable to individual and dietary variations. Ventricular conduction abnormalities were apparently more frequent among pesticide handlers than among non-handlers, according to EKG results.

72-1229. Kotlarek-Haus, S.; Dzierzkowa-Borodej, W.; Lawinska, B. (III. Klinik fuer Innere Krankheiten der Medizinischen Akademie, Wroclaw, Poland). **Autoimmunhaemolytische Anaemie nach Umgang mit Insektiziden und Pflanzenschutzmitteln bie gleichzeitiger Anwesenheit des Australia-Antigen (Au 1) im Serum. [Autoimmune hemolytic anemia after handling insecticides and herbicides, with simultaneous detection of the Australia antigen (Au 1) in the serum.]** *Folia Haematol. (Leipzig) 95(3): 249-253; 1971.* (11 references) (German)

A 57-year-old farmer was repeatedly hospitalized in 1967 to 1969 for hemolytic crises, coinciding with the times of pesticide applications to his fields. Findings upon admission included icterus, pulmonary rales, rapid heartbeat, and enlarged spleen. In serological studies, the direct Coombs test and Munk-Andersen test with washed and trypsinized erythrocytes were positive; the complement titer was 1:5 compared with 1:64 for the control at 100% hemolysis. Antibodies isolated from the erythrocytes were identified as anti-c γ-globulins. Upon readmission following a repeated application of Ditox (DDT + lindane), Lebaycid (fenthion) and Pielik (2,4-D) on his farm, a hemoglobin value 6.4%, erythrocytes 1.8 million/mm^3, and serum bilirubin 12.9% were found. The direct Coombs test was again positive, and could be blocked by either human γ-globulin or an isolated IgG. The presence of the Australia antigen in the blood was also noted. Improvement was attained by corticosteroid treatment, but further crises resulted in an intractable hemolytic state. Autopsy revealed slight chronic hepatitis, fatty liver, and loss of erythropoietic tissue from the bone marrow. An inborn erythrocyte defect may have existed.

72-1230. Kuratsune, M.; Yoshimura, T.; Matsuzaka, J.; Yamaguchi, A. (Dept. of Public Health, Faculty of Medicine, Kyushu U., Fukuoka, Japan). **Yusho, a poisoning caused by rice oil contaminated with polychlorinated biphenyls.** *HSMHA (Health Serv. Ment. Health Admin.) Health Rep. 86(12): 1083-1091; 1971.* (13 references)

The epidemic of yusho in Japan in the end of 1968 involved more than 1000 persons afflicted with such symptoms as follicular accentuation, acneform eruption, hyperpigmentation of skin and nails, hypesthesia, and hypersecretion of the meibomian glands. Early evidence pointed to the use of a certain brand of rice oil as the common factor in these patients; detailed studies of 325 such patients were conducted to establish the causative significance of this fact. These 325 patients belong to 112 families, indicating a distinct familial aggregation. The greatest number of cases occurred in June to August, 1968; persons above sixty were less frequently affected, but there were no other significant age or sex differences. Marked geographic patterns were noted, the highest incidence rates being found in urbanized areas of Fukuoka prefecture. Company records and examination of oil cans in the homes

of the patients revealed that practically all of them had probably used rice oil shipped between Feb. 5 and 15, 1968. Extensive questionnaires regarding personal habits revealed only that persons who often ate fried foods were more frequent among the patients, and persons with pets among the control group. A dose-response relationship was found, based on estimates of oil consumption and severity of symptoms. Rice oil shipped on the specified dates was found to be contaminated with up to 2000 ppm of Kanechlor (PCBs), which had apparently leaked into the oil from a heat-transfer pipeline. Babies or stillborn fetuses delivered to yusho patients exhibited an unusual dark-brown discoloration of skin, nails, and gingiva; some had increased eye discharge. Chemical assay revealed Kanechlor components in placenta and in subcutaneous fat of stillborn fetuses. Boys affected with yusho displayed reduced growth rates. The origin of this disease in the contaminated rice oil consumed seems undisputable.

72-1231. Prellwitz, W.; Schuster, H. P.; Schylla, G.; Baum, P.; Schoenborn, H.; Ungern-Sternberg, A. von; Brodersen, H. C.; Poeplau, W. (II. Medizinische Klinik und Poliklinik der Johann-Gutenberg Universitaet, Mainz, Germany). **Zur differentialdiagnose von Organbeteiligungen bei exogenen Intoxikationen mit Hilfe klinischer und klinisch-chemischer Untersuchungen. [Differential diagnosis or organ involvement in exogenous intoxications with the aid of clinical and clinical-chemical examinations.]** *Klin. Wochenschr. 48(1): 51-53; 1970.* (11 references) (German)

A series of laboratory values was compared in patients poisoned by hypnotic drugs, patients with other types of poisoning (parathion, carbon monoxide, thallium, and sodium nitrite) and control patients with other non-heart and non-liver-related diseases. Serum potassium, SGPT, and lactate dehydrogenase values did not differ significantly among these groups; however, serum creatine, CPK (creatine phosphokinase), and SGOT values were significantly elevated in both types of poisoning patients. A high degree of correlation was found between CPK activity and creatine values and between SGOT and creatine, and a correlation between SGOT and CPK. Since creatine occurs almost exclusively in the musculature, the authors conclude from these correlations that the transversely striated musculature undergoes hypoxic damage in poisoning cases. Lack of parallel increases in LDH and SGPT excludes liver involvement.

72-1232. Perini, G.; Ghezzo, F. (Istituto de Igiene, Universita di Ferrara, Ferrara, Italy). **Livelli urinari di acido diclorodifenilacetico (DDA) nella popolazione rurale ferrarese. [Urinary dichlorodiphenylacetic acid (DDA) levels in the rural population of Ferrara.]** *Arcisp. S. Anna di Ferrara 23(6): 549-558; 1970.* (26 references) (Italian)

Urinary levels of dichlorodiphenoxyacetic acid (DDA) were determined in 536 inhabitants of the rural district of Ferrara with different lengths of exposure (years of residence in the area) and intensities of exposure (occupational and environmental; high, medium, or low). Urinary DDA levels were very low in 38.4% of the total group; low levels occurred in 7.4% of the first group (136 heavily exposed persons), 30.9% in the second group (110 moderately exposed persons) and 55.9% of the third group (290 persons with mild exposure). The respective mean urinary DDA values for the three groups were 0.402, 0.142, and 0.061 ppm. Analysis of variance and comparison of subgroups demonstrated a significant relationship between intensity of exposure and DDA level, whereas the length of exposure was not nearly so closely related to DDA level. Thus determination of DDA in the urine appears useful for evaluating occupational and environmental exposure to DDT.

72-1233. Howard, Jr., F. M. (Mayo Clinic and Mayo Foundation, Rochester, MN). **Peripheral neuropathy as a sign of systemic disease.** *Postgrad. Med. 50: 107-113; 1971.*

Peripheral neuropathies (motor or sensory or, more commonly, mixed) may be symptomatic of many systemic disorders. The etiology is often difficult to determine, but observation of accompanying clinical features can suggest the diagnosis. Pesticides may cause peripheral neuropathy indirectly (by precipitating an attack of porphyria in a susceptible individual) or directly. Neuropathies with clinically distinctive features are caused by arsenic, thallium, or lead following exposure to pesticides or other materials containing them; Mees lines, alopecia and the lead line in the gums, respectively, provide clues to these types of poisoning. Questioning regarding pesticide exposure should always be included in the clinical history of a patient with peripheral neuropathy.

72-1234. Holden, A. V. (Freshwater Fisheries Lab. Faskally, Pitlochry, Scotland). **The effects of pesticides on life in fresh waters.** *Proc. Royal Soc. Ser. B. 180(1061): 383-394; 1972.* (23 references)

Due to a lack of direct information on the threat posed to aquatic life by environmental contamination with pesticides, conclusions must be drawn by juxtaposing laboratory toxicity data and environmental residue levels. The available data in these classes are reviewed, with particular reference to conditions in the United Kingdom. Of the 160 chemicals approved for agricultural and horticultural use, 60 are used in situations involving risk of entry to waterways. Residue levels of pesticides in Britain (mainly organochlorines) are low (generally below 100 ng/l.), except in the vicinity of some industrial discharges, or accidental spillages, where they approach the toxic threshold. Further study is

required on bioconcentration in fresh-water environments and on the toxicity of pesticides to species other than fish. The short-term toxicity tests required prior to introduction of new chemicals are usually carried out only on the adults of one fish species, which leaves much room for variation. Fish mortalities in Britain have been due mainly to organochlorine insecticides, but have also been caused by maneb, fentin hydroxide, dinoseb, and mecarbam.

72-1235. Day, H. M. (Agricultural Chemical Div., Stauffer Chemical Co., New York, NY 10017). **Use and disposal practices to maintain environmental quality.** *Proc. N. Cent. Weed Contr. Conf. 25: 13-15; 1970.*

The problem of pesticide container disposal has increased greatly in recent years not only because of the larger volumes now employed, but also because of the increasing use of liquid, as compared to granular or dust formulations. Dry formulations were often supplied in bags, which could be burned. Several government and industrial committees have been working on both interim and long-term solutions to the pesticide disposal problem, and guidelines will shortly be issued for various groups of pesticide users. Recommendations for homeowners include disposal of empty pesticide containers through regular trash collection channels after mutilating them to prevent reuse. "Do-nots" for homeowners include recommendations against burial or burning of pesticide containers and disposal of leftover materials in sewers, drains, or streams. Homeowners are also advised to leave the collection of waste pesticides up to professional waste disposal agencies. Burial still represents the major means of pesticide container disposal on the farm. Future guidelines for farmers will discuss storage of pesticide prior to collection by disposal agencies, decontamination procedures for steel and glass containers, and incentives for taking containers to disposal sites. High-temperature incineration seems to be the ideal ultimate disposal method at present.

72-1236. Fischer, H. (Akademie des Sanitaets- und Gesundheitswesens der Bundeswehr, Munich, Germany). **Vergiftungen. [Poisonings].** *Therapiewoche 21(31): 2177-2180, 2183-2186; 1971.* (109 references) (German)

General aspects of poisoning, mainly based on European experiences, are reviewed. The "Pesticides" section includes a report of respiratory failure after administration of succinylcholine in undiagnosed organophosphate poisoning; diagnosis and treatment indications in parathion poisoning; and cautions against mouth-to-mouth respiration in poisoning cases. Poisoning incidents due to endosulfan and Krezonit are reported. Experimental and clinical studies indicated that dangers of pesticides to the fetus are slight; clinical and experimental patho-anatomical findings in pesticide poisoning were also compared. The clinical evolution of a case of paraquat poisoning is described, and indications for treatment given. Material in other sections of the review also relates to pesticides, including mentions of pentachlorophenol, dieldrin, tri-*o*-cresyl phosphate, and cyanides.

See also 72-1125 72-1127 72-1138 72-1173 72-1178 72-1180 72-1187 72-1189 72-1192 72-1195 72-1246 72-1263 72-1344 72-1352

72-1237. Camargo, L. A. A.; Saad, W. A.; Larini, L. (Faculdade de Farmacia e Odontologia de Araraquara, Caixa Postal 331, Sao Paulo, Brazil). **Acute toxicity of fenitrothion (=Sumithion, Folithion).** *Arq. Inst. Biol. (Sao Paulo) 37(4): 219-222; 1970.* (10 references) (English)

The acute dermal LD50 of fenitrothion, *O,O*-dimethyl-*O*-(3-methyl-4-nitrophenyl) phosphorothioate, using female Wistar rats, was 1001.5 mg/kg with 95% confidence limits of 787.0 mg/kg to 1214.0 mg/kg. Care was taken to minimize stress during the experiment by choosing cages which allowed free movement of the animals. The compound was applied in the dorsal-tail region and the area was covered with a nylon screen. The oral LD50, using male Wistar rats, was 607.9 mg/kg with 95% confidence limits of 480.7 mg/kg and 968.6 mg/kg. The toxicity of this compound is quite low compared to that of methyl parathion and ethyl parathion which have similar structures.

72-1238. Nakanishi, M.; Kato, Y.; Furuta, T.; Miura, S. (Research Labs., Yoshitomi Pharmaceutical Industries Ltd., Fukuoka Pref., Japan). **[Studies on insecticides. VIII. Metabolic fate of proparthrin.]** *Bochu-Kagaku (Sci. Pest Contr.) 36(3): 116-121; 1971.* (8 references) (Japanese)

The metabolism of the tritium-labeled compound (^{3}H-proparthrin) of the new pyrethroid 2-methyl-5-(2-propynyl)-3-furylmethyl-2,2-dimethyl-3-(2-methyl-1-propenyl)-cyclopropane-carboxylate, or proparthrin, in rats was investigated. After peroral administration of 100 mg/kg, 40% and 35% of the radioactivity given was excreted in urine and feces respectively within 4 days; after intraperitoneal administration, 38% and 28% respectively were excreted in urine and feces within 4 days. The bile contained about 40% of the dose administered in the 24 hours after oral administration. Distribution of the radioactive compound or its metabolites in various tissues was followed by rapid disappearance from all tissues except the blood serum. The radioactivity was present in the serum in the form of a metabolite, and metabolites were also present (but the parent compound was not) in the urine and bile. The glucuronide of 3-hydroxymethyl-5-(2-propynyl)furan was identified as a major metabolite of proparthrin in the rat.

72-1239. Stach, R.; Vetulani, J.; Trabka, J.; Slominska-Zurek, J. (Dept. of Pharmacology, Polish Academy of Sciences, Krakow, Poland). **The effect of dimethyldithiocarbamate on the bioelectric activity and monoamine content in the rabbit brain.** *Diss. Pharm. Pharmacol. 23(4): 353-362; 1971.*

The bioelectric activity of rabbit brain was recorded following implantation of electrodes in the motor cortex, reticular formation, dorsal hypothalamic nuclei and lateral thalamic nucleus. The rabbits were immobilized with gallamine; a constant increase in the alert index of the EEG was noted, along with changes in the concentration of monoamines in some brain structures, especially the hypothalamus. Administration of sodium dimethyldithiocarbamate (Dibam) to such animals resulted in an additional increase in the alert index during the first 90 min, accompanied by an increase in the dopamine concentration of the hypothalamus; these two factors (alert index and dopamine concentration) were positively correlated at half an hour after Dibam administration. Subsequently, Dibam depressed the noradrenaline content of hypothalamus and hippocampus, and enhanced the dopamine content of the hippocampus, but not of the hypothalamus. At this time (150 min after Dibam administration), the alert indices of control and experimental animals were the same.

72-1240. Maj, J.; Sowinska, H.; Baran, L. (Dept. of Pharmacology, Polish Academy of Sciences, Krakow, Poland). **The effect of thiram on locomotor activity and brain levels of catecholamines in mice and rats.** *Diss. Pharm. Pharmacol. 23(4): 375-382; 1971.* (22 references)

Thiram (tetramethylthiuram disulfide) was expected to be analogous to disulfiram in mice and rats, in inhibition of dopamine-β-hydroxylase activity, and depression of brain noradrenaline levels. Brain noradrenaline levels in mice were reduced 4 hr after peroral administration of 100 mg/kg thiram, while the higher dose level (200 mg/kg) resulted in a similar depression within 2 hr. The dopamine level remained unchanged. The LD50 of thiram in mice was approximately 200 mg/kg i.p.; toxic doses produced sedation and hypothermia. Thiram reduced spontaneous locomotor activity in mice in a dose-dependent manner, but lowered the amphetamine-stimulated locomotor activity only slightly. Pretreatment with nialamide attenuates the depressive action of intraperitoneally and orally administered thiram. Both a "catecholaminergic" and a "non-catecholaminergic" mechanism are presumed to be involved in the sedative activity of thiram.

72-1241. Gertig, H.; Nowaczyk, W.; Sawicka, B. (Sieroca 10, Poznan, Poland). **The effect of aldrin, dieldrin, lindane, DDT, DDD, and DDE on the activity of alkaline and acid phosphatase.** *Diss. Pharm. Pharmacol. 23(5): 541-543; 1971.* (4 references)

In vitro studies on human and porcine serum phosphatases indicate that the insecticides tested have only a very weak effect, the largest change being 18%. Aldrin, lindane, and DDD (TDE) seem to activate the human serum alkaline phosphatase, and dieldrin, DDT, and DDE inhibit it. All of these compounds inhibited human serum acid phosphatase, except DDD. Both alkaline and acid phosphatases from porcine serum were slightly activated by all the insecticides tested. These enzymes will probably not be useful in the diagnosis of chronic insecticide poisoning.

72-1242. Gertig, H.; Nowaczyk, W.; Sierzant, M. (Sieroca 10, Poznan, Poland). **The effect of aldrin, dieldrin, lindane, DDT, DDD, and DDE on the activity of aspartate and alanine aminotransferase.** *Diss. Pharm. Pharmacol. 23(5): 545-548; 1971.* (8 references)

In vitro studies on human serum aminotransferases, aldrin, dieldrin, DDT, DDD (TDE), and DDE activated both L-aspartate: 2-oxoglutarate aminotransferase (SGOT) and L-alanine: 2-oxoglutarate aminotransferase (SGPT), although the solvent used had a marked effect on the enzyme. Lindane activated SGPT and inhibited SGOT. Using porcine serum, the solvent (isoproponal) and dieldrin activated SGOT and the others inhibited it. Aldrin, dieldrin, and DDE activated SGPT, while isopropanol, lindane, DDT, and DDD appeared to have inhibited it.

72-1243. Foltinova, J.; Horak, F.; Stanislavova, M. (Dept. of Histology and Embryology, Komensky U., Bratislava, Czechoslovakia). **Structural changes of the liver after the administration of derivatives of symmetric triazines.** *Folia Histochem. Cytochem. 9(3): 339-340; 1971.* (3 references)

Histological studies of the liver were performed following 8-day administration of the following symmetric triazines to Wistar rats: monothiocyanuric acid, dithiocyanuric acid, 2,4-dithio-6-methyl-*s*-triazine. Trithiocyanuric acid caused the most damage to the liver. Lymphocytic deposits were found immediately under the capsule. Parenchyma cells surrounding the deposits were deformed and principally contained dark nuclei. Deep in the liver parenchyma the liver tissue was destroyed and it appeared much paler on hematoxylin-eosin-stained sections. A frothy structure gave a positive lipid reaction. Carbohydrate reactions were weak in the destroyed tissue. Those liver cells present in isolation had mainly small dark pycnotic nuclei.

72-1244. Hill, E. F. (Patuxent Wildlife Research Center, Laurel, MD 20810). **Toxicity of selected mosquito larvicides to some common avian species.** *J. Wildl. Manage. 35(4): 757-762; 1971.* (9 references)

The relative toxicity of DDT, Abate, bromophos, and Gardona was determined in both farm-reared and wild-captured bobwhites (*Colinus virginianus*), blue jays (*Cyanocitta cristata*), house sparrows (*Passer domesticus*), and cardinals (*Richmondena cardinalis*). The 8-day LC50 was determined for all chemicals against each species. The usual order of toxicity was Abate > DDT > bromophos > Gardona and the order of avian sensitivity was blue jay > sparrow > cardinal > bobwhite (wild) > bobwhite (farm). This order of sensitivity was size-related except for blue jays, which were surprisingly sensitive to all compounds. Intoxication from the organophosphates tested tended to reverse more rapidly than intoxication from DDT.

72-1245. Dahlgren, R. B.; Greichus, Y. A.; Linder, R. L. (South Dakota Cooperative Wildlife Research Unit, Brookings, SD 57007). **Storage and excretion of polychlorinated biphenyls in the pheasant.** *J. Wildl. Manage. 35(4): 823-828; 1971.* (18 references)

Hen pheasants (*Phasianus colchicus*) were administered polychlorinated biphenyls (PCB) either by injection or ingestion. Of the 94% absorbed from a 50-mg capsule, 4.0 mg was excreted in the feces and 4.2 mg excreted in the eggs over 28 days. PCB levels were highest in the liver, followed by brain and muscle, peak absorption being 12 hours after administration. Egg-laying declined in hens fed 50-mg capsules of PCB. Analysis of whole bodies revealed that hens that received 12.5 mg PCB weekly for 17 weeks retained from 37 to 56% of the administered dose whereas hens that received 50 mg per week retained from 60 to 82% of the administered dose. Egg production can be an important means of excretion of PCB. During the second week after administration of a 50-mg capsule, an average of 1.5 mg PCB per egg was excreted.

72-1246. Nimmo, D. R.; Blackman, R. R.; Wilson, Jr., A. J.; Forester, J. (Environmental Protection Agency, Gulf Breeze Laboratory, Sabine Island, Gulf Breeze, FL 32561). **Toxicity and distribution of Aroclor 1254 in the pink shrimp** *Penaeus duorarum. Mar. Biol. 11(3): 191-197; 1971.* (8 references)

Following an accidental leakage of Aroclor 1254 into the Escambia River near Pensacola, Florida, its toxic levels, routes of entry, distribution and elimination were studied in shrimp under laboratory conditions, and residue data was collected on shrimp in the estuary. Determinations were made by gas chromatography and data reported do not include a correction factor for the 80% recovery. Aroclor 1254 was found to be about one tenth as toxic to juvenile *Penaeus duorarum* as DDT. Within 15 days of exposure to 0.94 ppb Aroclor 1254, 51% of the juvenile shrimp were killed, while in adults exposure to 3.5 ppb for 35 days resulted in 50% killed. Shrimp showed delayed mortality and no apparent prior symptoms of poisoning with all concentrations of the chemical. Accumulation in the hepatopancreas, which was the largest, and whole body was linear with time, while peak accumulation in the muscle was reached in 2 days. Aroclor 1254 persisted in most tissues at a constant level, but half of the accumulation in the hepatopancreas was eliminated within 17 days postexposure. Whether food or water constituted the primary source of contaminant was unresolved. In field studies, the highest residues were found in shrimp from areas of low salinity. No dead or drying shrimp areas were found, but deaths would be difficult to observe. Sufficient evidence of contamination is presented to warrant an increase in monitoring of industrial waste.

72-1247. Epifanio, C. E. (Coll. of Marine Studies Field Station, U. of Delaware, Lewes, DE 19958). **Effects of**

dieldrin in seawater on the development of two species of crab larvae, *Leptodius floridanus* and *Panopeus herbstii*. *Mar. Biol. 11(4): 356-362; 1971.* (23 references)

Ten ppb of dieldrin prevented two species of xanthid crabs (*L. floridanus* and *P. herbstii*) from developing to the megalopa stage. Species differences in response were noted, but it was concluded that concentrations of 1 ppb or higher in seawater are deleterious to xanthid crab larvae. Toxicity varied depending on the stage at which larvae were exposed, and length of time of exposure was less important. Dieldrin had no effect on survival in groups which were not exposed until the zoeal stage III or IV. Sevin (carbaryl), dieldrin, and stress salinities all affect the molting process in crab larvae, but literature values for Sevin toxicity indicate that it is less toxic than dieldrin to carb larvae. Since it has been demonstrated that very low concentrations of insecticide could change the larval population-age structure, all stages in the life cycle of a species should be studied in evaluating toxicity of a compound.

72-1248. Stelzer, R.; Rosenthal, H.; Siebers, D. (Institut fuer Hydrobiologie und Fischereiwissenschaft der Universitaet Hamburg, Hamburg 50, Germany). **Einfluss von 2,4-Dinitrophenol auf die Atmung und die Konzentration einiger Metabolite bei Embryonen des Herings *Clupea harengus*. [Influence of 2,4-dinitrophenol on respiration and concentration of some metabolites in embryos of the herring, *Clupea harengus*.]** *Mar. Biol. 11(4): 369-378; 1971.* (57 references) (German)

Developmental parameters of herring eggs incubated with and without the addition of 2,4-dinitrophenol (2,4-DNP) were determined. The oxygen consumption increased in an irregular fashion during development; addition of 2,4-DNP to the incubation medium resulted in an extreme intensification of respiratory activity. The maximum increase in oxygen consumption in comparison to normal values (equal to 400%) was found at the beginning of gastrulation, followed by a reduction to a 30% increase above normal just before hatching (when the normal respiration curve is also at a low level). The respiration curves are generally similar regardless of the developmental stage at which poisoning occurs, except in the epibolic phase shortly before closure of the blastopore and after the fourth day of development. The ATP level normally remains almost constant during development; after 2,4-DNP poisoning, it drops to about 50% of the control values. The carbohydrate content is also considerably reduced by 2,4-DNP addition. The ontogenetic age of the deformed embryos capable of surviving for several days coincides with that of the embryos which display reduced respiratory activity under normal conditions. In addition, the uncoupled respiration has certain unique features at these developmental stages.

72-1249. Seidler, H.; Haertig, H.; Schnaak, W.; Engst, R. (Zentralinstitut fure Ernaehrung der Deutschen Akademie der Wissenschaften, Potsdam-Rehbruecke, Germany). **Untersuchungen ueber den Metabolismus einiger Insektizide und Fungizide in der Ratte. 3 Mitt.: Ausscheidung, Verteilung und Abbau von ^{35}S-markiertem Captan. [Studies on the metabolism of some insecticides and fungicides in the rat. Part 3: Excretion, distribution and degradation of ^{35}S-labeled Captan.]** *Nahrung 15(2): 177-185; 1971.* (8 references) (German)

After administration of a single dose (143 or 390 mg/kg body weight) of ^{35}S-Captan to rats, more than 90% of the quantity administered is excreted in urine and feces in the first 24 hours, and essentially all of the remainder within the next two days. At least 60% of the Captan is rapidly resorbed, metabolized, and excreted in the urine. About 0.01 to 0.05% of the ^{35}S-activity is deposited in the organs in the form of metabolites or incorporated by the body into various compounds. The fractionation of the residues from chloroform extraction suggested incorporation of the ^{35}S into proteins and nucleoproteids. Some of the Captan metabolites were characterized by thin-layer chromatography and autoradiography.

72-1250. Preiss, D.; Rossner, J. A.; Bodem, R. (Pathologisches Institut der U. Heidelberg, Heidelberg, Germany). **Wirkung von 2,4-Dichlorphenoxyacetat auf das transversale tubulaere System des Myocard. [Effect of 2,4-D on the transverse tubular system of the myocardium.]** *Naturwissenschaften 58(11): 576-577; 1971.* (7 references) (German)

The herbicide 2,4-D is known to produce myotonia-like reactions in animals. Further studies on this effect were performed on guinea pig papillary muscles, whole feline and guinea pig atria, and thin ventricle strips from frog hearts. These preparations, incubated in baths with and without the addition of 2,4-D, were electrically stimulated in six periods of 100 stimuli each, and specimens fixed after 10, 30, and 100 contractions in the third and sixth stimulus phases before and after addition of 2,4-D, as well as in the stimulus-free interval after the sixth stimulation phase. The myotonia-like effects of 2,4-D were absent in the case of frog myocardium and atrial musculature of guinea pigs and cats, none of which contains tubular structures. Distinct expansion of the transverse tubuli was observed in guinea pig papillary muscles after 15 min of incubation in a solution containing 2.5 m*M* of 2,4-D. These findings are interesting in light of the changes in the transverse tubular system and in the sarcoplasmatic reticulum which have been described in the muscle fibers of patients with myotonic muscle function disorders.

72-1251. Funnell, H. S.; Platonow, N. S. (Department of Biomedical Sciences, University of Guelph, Guelph, Ontario, Canada). **Study on the metabolism and some effects of polychlorinated biphenyls in chickens.** *Proc. Can. Fed. Biol. Sci. 14: 66; 1971.*

The distribution and metabolic transformation of polychlorinated biphenyls (PCBs) in various tissues of chickens fed PCBs were followed for up to three months. PCB accumulation in the tissues studied apparently progresses linearly with time. PCB administration was followed by a significant decrease in size of testicles and combs. (Abstract of a paper for the 14th Annual Meeting of the Canadian Federation of Biological Societies [Federation Canadienne des Societes de Biologie] at the University of Toronto, Toronto, Ontario on June 15-18, 1971.)

72-1252. McKay, D. H.; Jardine, R. V.; Adie, P. A. (Biomedical Section, Defense Research Establishment Suffield, Ralston, Alberta, Canada). **The synergistic action of 2-(*o*-cresyl)-4*H*-1:3:2-benzodioxaphosphorin-2-oxide with soman and physostigmine.** *Toxicol. Appl. Pharmacol. 20(4): 474-479; 1971.* (13 references)

The synergism which has been reported between tri-*o*-cresyl phosphate (TOCP) and cholinesterase inhibitors has been extended to the cyclic metabolite of TOCP, 2-(*o*-cresyl)-4*H*-1:3:2-benzodioxaphosphorin-2-oxide (CBDP). This metabolite has been examined using a reversible inhibitor physostigmine, and a nonreversible inhibitor soman (pinacolyl methylphosphonofluoridate). Studies carried out on male white mice revealed that at doses of 35 mg/kg CBDP the activity of soman was enhanced over 18-fold, while that of physostigmine was raised somewhat less than 2-fold. (Author abstract by permission.)

72-1253. Cranmer, M.; Peoples, A.; Chadwick, R. (Perrine Primate Laboratory, Environmental Protection Agency, Perrine, FL 33157). **Biochemical effects of repeated administration of *p,p'*-DDT on the squirrel monkey.** *Toxicol. Appl. Pharmacol. 21(1): 98-101; 1972.* (7 references)

p,p'-DDT was administered po in peanut oil to 5 groups of 6 squirrel monkeys at doses of 50, 5, 0.5, 0.05, and 0 mg/kg/day. Blood samples were taken weekly from each animal; several hematologic parameters were determined, and plasma amylase, aldolase, glutamic-pyruvic transaminase, and isocitric dehydrogenase were measured. Two monkeys from each group were killed after 2, 4 and 6 mo and *in vitro* liver homogenate enzyme activity was measured using *p*-nitroanisole and ethyl *p*-nitrophenyl phenylphosphonothioate as substrates. No discernible effects on hematologic values or plasma enzyme levels were observed. The stimulation of the two liver homogenate mixed-function oxidases was maximal after 2 mo treatment. There were no significant differences in the levels of homogenate enzyme activity at the three sacrifice periods. The monkeys given 50 mg/kg/day all died within 14 wk of starting treatment; deaths did not occur at the other doses. (Author abstract by permission.)

72-1254. Strother, A. (Dept. of Pharmacology, Loma Linda U. Sch. of Medicine, Loma Linda, CA 92354). *In vitro* **metabolism of methylcarbamate insecticides by human and rat liver fraction.** *Toxicol. Appl. Pharmacol. 21(1): 112-129; 1972.* (27 references)

Comparative *in vitro* metabolic activity of human and rat liver fractions toward 5 ring-substituted methylcarbamates are reported. Human liver appeared to be less metabolically active than rat liver toward 4-dimethylamino-3,5-xylyl methylcarbamate (Zectran), 4-dimethylamino-3-cresyl methylcarbamate (Matacil, aminocarb), 4-methylthio-3,4-xylyl methylcarbamate (Mesurol, methiocarb), and 1-naphthyl methylcarbamate (carbaryl). In these studies the human liver metabolized 2-chloro-4,5-xylyl methylcarbamate (Banol) as well as did the rat. Both species produced essentially the same major metabolites from the carbamates although quantitative differences were observed. Ring hydroxylation and *N*-dealkylation are the main oxidative metabolic pathways of carbamate metabolism studied in both the human and rat. The human liver produced a few metabolites not seen with the rat liver. The human liver had more difficulty oxidizing the *N*-methylcarbamate side chain to form the *N*-hydroxymethylcarbamate derivative of all the carbamates except Mesuroi. In both species the major metabolic products from the carbamates retained the OC(O)NC group necessary for acetylcholinesterase inhibition. (Author abstract by permission.)

72-1255. Komissarenko, V. P.; Turchin, I. S. (Kiev Research Inst. for Endocrinology and Related Subjects, Kiev, USSR). **Tsitologicheskiye izmeneniya v kletochnykh kulturakh pochek zhivotnykh i cheloveka pod vliyaniyem *o,p'*-DDD. [Cytologic changes in cell cultures from animal and human kidneys under the influence of *o,p'*-DDD.]** *Tsitol. Genet. 5(3): 250-254; 1971.* (16 references) (Russian)

The effects of *o,p'*-DDD (TDE) on monolayer cell cultures from kidneys of newborn rabbits, dogs and guinea pigs, and from human fetuses, obtained by trypsinization, were investigated. Progressive morphological changes, which resulted in cellular destruction, were produced by exposure to *o,p'*-DDD (median cytotoxic dose, 60-100 μg/ml medium). The nature of the cytologic change produced depended on the *o,p'*-DDD concentration and the contact time. First to appear was vacuolation in the cytoplasm. This was followed by changes in the nucleus, consisting of redistribution of chromatin, vacuolation and development of protuberances in the nuclear membrane. Human and dog kidney cell cultures were more sensitive to *o,p'*-DDD than rabbits or guinea pigs.

72-1256. Vartic, N.; Giurgea-Jacob, R.; Suteu, E. (Landwirtschaftliches Institut "Dr. Peter Groza" der Veterinaermedizinischen Fakultaet, Cluj, Rumania). **Die Dynamik einiger Blutkonstanten beim Huhn unter**

Einwirkung des organischen Phosphorkombinationsproduktes "Bubulin". [The dynamics of some blood values in the chicken under the influence of the organophosphate combination product, Bubulin.] *Arch. Exp. Veterinaermed. 25(5): 831-838; 1971.* (15 references) (German)

Bubulin, consisting of a 50% v/v solution of trichlorfon in a mixture of polyhydric alcohols plus 0.5% v/v of pyridine aldoxime methiodide and 0.15% v/v of atropine sulfate, was given intramuscularly at 10 mg/kg body weight to ten cockerels. Blood samples were taken from the comb half an hour before injection and 1, 6, 24, and 72 hr after injection. The differential white blood cell count was altered by the development of marked, transient eosinophilia, lymphopenia and persistent neutrophilia. The hemoglobin and erythrocyte levels decreased, and remained somewhat reduced during the test period. The blood protein content dropped in the first six hr after injection, then rose again to near normal. The albumin fraction of the blood protein was essentially unchanged, while α-, β- and γ-globulins fell immediately after the injection, and the A/G ratio fluctuated. The SGOT dropped to less than half of its normal value within six hr after the injection, then rose to almost double the normal value by the 24th hr. A minimum in the SGPT concentration occured at 24 hr. The free amino acid content of the blood also displayed a minimum after about six hr.

72-1257. Davison, K. L.; Sell, J. L. (U.S. Dept. Agriculture, Metabolism and Radiation Research Lab., Animal Science Research Div., ARS, Fargo, ND 58102). **Dieldrin and *p,p'*-DDT effects on egg production and eggshell thickness of chickens.** *Bull. Environ. Contam. Toxicol. 7(1): 9-18; 1972.* (21 references)

The effects on egg production of feeding calcium sufficient diets containing 10 and 20 ppm dieldrin and 100 and 200 ppm *p,p'*-DDT for 12 weeks were studied in leghorn hens. Egg production per bird and shell calcium were not affected. The weights of the eggs, eggshells and dried contents were not significantly different from control weights. Shell thickness appeared to have been increased by dieldrin. The authors attribute the statistical significance of this finding to chance, since there was no dose response and analysis of eggs collected in clutches showed no differences among treatments. Insecticide X time interactions were not evident in any of the parameters studied.

72-1258. Graham, S. L.; Hansen, W. H. (Div. of Pesticide Chemistry and Toxicology, Food and Drug Administration, Dept. of Health, Education and Welfare, Washington, DC). **Effects of short-term administration of ethylenethiourea upon thyroid function of the rat.** *Bull. Environ. Contam. Toxicol. 7(1): 19-25; 1972.* (10 references)

The effects of ethylenethiourea (ETU) on thyroid function in male Osborne-Mendel rats were studied to determine whether thyroid effects observed with ethylenebisdithiocarbamate fungicides were caused by ETU, a degradation product. Lower food consumption and body weights, which differed most substantially from control values at early time points, were observed with dietary levels from 50 to 750 ppm. A significant increase in ratio of thyroid weight to body weight of rats fed at 500 and 750 ppm was found at each time point, and the ratio with 100 ppm was slightly higher than control. The uptake of ^{131}I measured at 24 hrs on days 30, 60, and 120 decreased significantly with levels of 100, 500, and 750 ppm ETU. The thyroid glands of rats fed at the 500 and 750 ppm levels showed marked to moderate hyperplasia, lack of colloid material, heightened epithelial walls and adenomas. An investigation of the ethylenebisdithiocarbamates will be carried out using materials of known purity.

72-1259. Cullimore, D. R.; Smith, A. E. (Biology Dept., Saskatchewan U., Regina, Saskatchewan, Canada). **Initial studies on the microbial breakdown of triallate.** *Bull. Environ. Contam. Toxicol. 7(1): 36-42; 1972.* (8 references)

Microorganisms were isolated from three sources for the study of the breakdown of triallate: stock solutions which had broken down rapidly, found to contain *Penicillium* and *Chladosporium*; a treated Regina heavy clay, from which 39 cultures were obtained; and treated Weyburn loam, from which 22 cultures were obtained. A medium containing 3 ppm triallate was prepared on which a variety of pure cultures from the laboratory could survive for 53 days. An experiment using filter paper disks containing *n*-butanol or *n*-butanol and triallate indicated that more gram positive bacteria (41%) were sensitive to the compound than gram negative (17%). The technique did not indicate whether triallate was degraded by any organisms. In an experiment designed to determine whether or not the compound was degraded by several molds, it was found through the use of several extraction solvents that triallate is absorbed onto the mycelium. Any losses recorded with the initial solvent were probably due to absorption.

72-1260. Cunningham, H. M.; Williams, D. T. (Research Laboratories, Food and Drug Directorate, Tunney's Pasture, Ottawa, K1A OL2, Ontario, Canada). **Effect of tetrachlorodibenzo-*p*-dioxin on growth rate and the synthesis of lipids and proteins in rats.** *Bull. Environ. Contam. Toxicol. 7(1): 45-51; 1972.* (11 references)

In male Wistar rats treated with 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, the incorporation of ^{14}C-leucine into the liver protein increased, but there was no dose response. In the heart, ^{14}C-leucine incorporation was not changed, but the incorporation of ^{3}H-acetate by

epididymal adipose tissue was significantly reduced. During a time study, an effect on the ^{3}H-acetate uptake by liver lipids was noted at 2 days and a significant decline was seen at 7 days. An increase in liver weight occurred with a dose as low as 0.1 μg/kg. It was determined that total incorporation of ^{3}H-acetate into liver lipids was not affected by dioxin, but the specific activity was reduced by the increase in unlabelled liver lipids.

72-1261. Focht, D. D. (Dept. of Soil Science and Agricultural Engineering, U. of California, Riverside, CA). **Microbial degradation of DDT metabolites to carbon dioxide, water and chloride.** *Bull. Environ. Contam. Toxicol. 7(1): 52-53; 1972.* (5 references)

The degradation of *p,p'*-dichlorodiphenylmethane (DDM), a product of the metabolism of DDT by *A. aerogenes*, to water, carbon dioxide and HCl was demonstrated. A bacterial isolate, *Hydrogenomonas*, capable of cleaving both benzene rings of DDM, and fungal isolate, *Moniliaceae*, as a mixed resting cell suspension yielded about 15% chloride when incubated with DDM. Growing mixed cultures yielded a higher percentage although conversion was not complete. The fungus grew on both ring fission products extracted from bacterial cell suspensions incubated with DDM and *p*-chlorophenylacetic acid. Degradation of DDM to chloride is probably limited by its low solubility and toxicity to the bacterium. In order to optimize conditions for degradation, an energy source, added in small amounts to prevent overgrowth of the bacterium, is needed. The author favors the investigation of controlled mixed cultures with relation to metabolism of molecules such as DDT, since it is closer to the natural situation than the pure culture technique.

72-1262. Williams, D. T.; Cunningham, H. M.; Blanchfield, B. J. (Research Laboratories, Food and Drug Directorate, Tunney's Pasture, Ottawa K1A OL2, Ontario, Canada). **Distribution and excretion studies of octachlorodibenzo-*p*-dioxin in the rat.** *Bull. Environ. Contam. Toxicol. 7(1): 57-62; 1972.* (11 references)

The absorption, excretion and distribution of octachlorodibenzo-*p*-dioxin were investigated in preparation for metabolic studies. Following administration of the compound in corn oil mixed with the diet, toxic effects reported in the literature for toxic fat were not observed. Samples found to contain residues of the chemical were, in order of decreasing concentration, feces, liver and adipose tissue. None was detected in the urine and only trace amounts in the bile, suggesting that material found in the feces had not been absorbed. The results indicate that octachlorodibenzo-*p*-dioxin should be suitable for metabolic studies.

72-1263. Tschudy, D. P.; Bonkowsky, H. L. (Metabolism Branch, National Cancer Inst., National Inst. of Health, Bethesda, MD). **Experimental porphyria.** *Fed. Proc., Fed. Amer. Soc. Exp. Biol. Med. 31(1): 147-159; 1972.* (128 references)

The close historical relationship between clinical observations and treatment of porphyrias in man and the production of experimental porphyrias in animals with various chemicals is reviewed. The biochemical disorders produced in animals by certain compounds resemble different types of clinically observed human hepatic porphyria, and also provide models for the study of a complex control mechanism in mammalian liver, specifically, the induction of the mitochondrial enzyme δ-aminolevulinic acid synthetase, which plays a major role in the control of heme biosynthesis. Observations of porphyria in persons who had eaten wheat treated with hexachlorobenzene as a fungicidal seed dressing in Turkey suggested the use of this compound in the production of experimental porphyria. The resulting disorder shows a close biochemical resemblance to naturally occurring cutanea tarda porphyria in man.

72-1264. Tinsley, I. J.; Lowry, R. R. (Dept. of Agricultural Chemistry, Oregon State U., Corvallis, OR 97331). **An interaction of DDT in the metabolism of essential fatty acids.** *Lipids 7(3): 182-185; 1972.* (9 references)

The depressed growth rate of female rats receiving a diet deficient in essential fatty acids (EFA) was further reduced by the incorporation of DDT into the ration. DDT produced a slight stimulation of growth in rats fed a similar diet supplemented with EFA. Liver lipid composition indices were also substantially changed by DDT feeding, with or without EFA supplementation of the deficient diets; the changes were more pronounced in male rats. It is suggested that the changes may be related to the proliferation of hepatic smooth endoplasmatic reticulum induced by DDT. This tissue constitutes a major part of the microsomal fraction which accounts for 38% of the total phospholipids in the rat liver. These tissue changes could increase the demand for essential fatty acids by the liver.

72-1265. Niehuss, M.; Boerner, H. (Institut fuer Phytopathologie der Christian-Albrechts-Universitaet, Kiel, Germany). **Untersuchugen ueber den Einfluss von Herbiziden auf Fische. [Investigations on the effects of herbicides on fish.]** *Nachrichtenbl. Deut. Pflanzenschutzdienstes 23(8): 113-117; 1971.* (10 references) (German)

The short-term (24 to 96 hr) and long-term (up to 3 mo) toxicity of several herbicidal formulations and active ingredients was studied, using 3-to-4-month-old guppies (*Lebistes reticulatus Peters*) as the test fish. In the long-term tests, half of the water was replaced every ten days with fresh water containing the herbicides at their initial concentration. The LC50 for aminotriazole (amitrole) in the form of Weedazol Urania or

Aminotriazole Spray Powder-Bayer was approximately 3000 ppm, whereas for the technical pure substance, extrapolated to 100%, it was more than 12,500 ppm. This is explained by the fact that the wetting agent used in the formulation was almost 100 times more toxic to fish than the herbicidal ingredient. The first deaths with Dalapon occurred at 875 ppm. Delayed fish deaths occurred with diuron when the level of its more toxic degradation product, 3,4-dichloroaniline, reached 0.5 ppm, which occurred after about 50 days in the aquaria containing 4 ppm diuron. The LC50 for dichlobenil was established as 25 ppm, although death did not occur at this level until about 120 hours after the beginning of exposure. The paraquat LC50 was 33 ppm. Comparison of these values with the residues found in drainage ditches after field spraying indicated that the possibility of direct fish poisoning by herbicidal application is remote.

72-1266. Natoff, I. L. (Shell Research Ltd., Tunstall Laboratory, Sittingbourne, Kent, England). **Organophosphorus pesticides: pharmacology.** *Progr. Med. Chem. 8(Pt.1): 1-37; 1971.* (253 references)

A review is presented which summarizes some of the recent developments in the mammalian pharmacology of organophosphates. Since inhibition of ChE is the primary biological effect of organophosphates in mammals, references to various methods of its assay are included. Anticholinesterase activity of phosphorothionate pesticides follows *in vivo* conversion to their oxo-analogues. Phosphorodiamidic fluorides are also activated *in vivo*. In the rat, sex hormones, age, and microsomal enzyme inducers affect toxicity. Differences in the reaction of various species is quite pronounced. The rate of onset of ChE inhibition may be the important aspect in toxicity. The toxic syndrome and symptoms include central and autonomic nervous system effects, centrally mediated autonomic effects, delayed neurotoxicity and teratogenic effects. Death generally results from respiratory arrest, often caused by depression of the medullary centers in the central nervous system. Detoxification is generally accomplished by removal of the phosphate ester group which prevents the enzyme-inhibitor reaction. A discussion of detoxification includes the effect of route of administration, the role of microsomal enzymes, inhibition of hydrolytic enzymes, dealkylation, nitro-reduction, stereospecificity, species differences and protein adsorption. The most suitable agents for treatment of poisoning by ChE inhibitors are atropine, hyocine and other solanaceous alkaloids which block autonomic post-ganglionic parasympathetic receptors. Many other agents and combinations of agents are used for particular effects. Oximes act to prevent the irreversible reaction of enzyme-inhibitor.

72-1267. Ernst, W. (Institut fuer Meeresforschung, Bremerhaven, Germany). **Stoffwechsel von Pesticiden in marinen Organismen II. Biotransformation und Akkumulation von DDT-^{14}C in Plattfischen:** *Platichthys flesus.* **[Metabolism of pesticides in marine organisms. II. Biotransformation and accumulation of DDT-^{14}C in flounder,** *Platichthys flesus.***]** *Veroeff. Inst. Meeresforsch. Bremerhaven 12: 353-360; 1970.* (8 references) (German)

Ring-labeled DDT-^{14}C was placed on Polychaete worms, which were then fed to flounder. Either single doses (24.5 or 5.4 μg) or repeated doses (total of 10 to 24 μg in 1 or 2 weeks) resulted in fairly rapid uptake from the gastrointestinal tract and distribution into body tissues. Six hours after administration of a single dose of DDT, about 10% of the total radioactivity partitioned into the aqueous phase of the mixture formed after extraction of the contents of the gastrointestinal tract with *n*-heptane, and therefore probably represented a more polar metabolite of DDT. After administration of DDT for 14 days (total 14.8 μg DDT) to one fish, followed by a waiting period of 28 days, 0.85% of the dose administered was found in the brain and 1.85% in the liver. The kidneys contained 0.68% and the washed out gastrointestinal canal, 2.81%. The gastrointestinal contents still retained 0.46% at this time, and 13.30% was located in the muscles. A total of 10.77% of the DDT administered was detected in the water of the aquarium during the administration period. Experiments using larger amounts of DDT will be performed, to determine whether conjugated polar metabolites are excreted in the water.

72-1268. Ernst. W. (Institut fuer Meeresforschung, Bremerhaven, Germany). **Stoffwechsel von Pesticiden in marinen Organismen. III. Abbau und Speicherung von DDT-^{14}C in Plattfischen,** *Solea, solea*, **im Kurzzeitversuch. [Metabolism of pesticides in marine organisms. III. Degradation and storage of DDT-^{14}C in sole,** *Solea solea*, **in short-term experiments.]** *Veroeff. Inst. Meeresforsch. Bremerhaven 12: 361-364; 1970.* (1 reference) (German)

Nine days after oral administration of a single dose of 1.8, 5.4, or 9.0 g DDT about 10% of the dose was detected as DDD. Only traces of DDE were found. The brain extract contained an additional substance which was not identical in chromatographic behavior with either DDD or DDE. DDT was found in the feces but polar metabolites were absent. The DDT concentration in the brain after 9 days of feeding a normal diet following DDT administration was approximately 5 times higher than the whole-body concentration.

72-1269. Sadriyeva, R. V.; Absalyamov, I. F.; Glebkashanskaya, N. V. (I. P. Pavlov Medical Inst., Samarkand, USSR). **Dinamika morfologicheskikh izmeneniy v slizistoy obolochke nosa pri dlitel'nom vvedenii malykh doz geksakhlorana. [The dynamics of morphological changes in the nasal mucous membrane in prolonged**

peroral administration of small doses of hexachlorane.] *Vestn. Otorinolaringol. 33(92-95); 1971.* (7 references) (Russian)

Morphological changes occurring in the nasal mucous membranes of rabbits were investigated during long-term peroral administration of (1 mg/kg body weight/day) of hexachlorane (BHC). No changes were noted during the first 40 to 50 days. After this time, however, the animal's body defenses and compensatory reserves apparently weaken, and the development of vascular walls and perivascular spaces. Mucosal dystrophy advances to acute catarrhal rhinitis. By the 90th day of BHC administration, exudative changes have diminished and productive processes prevail. On the 104th day, a general diminution in the pathological processes was noted.

72-1270. Schoene, K. (Institut fuer Aerobiologie der Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Grafschaft/Hoschsauerland, Germany). **Reaktivierung von *O,O*-Diaethylphosphoryl-acetylcholinesterase. Reaktivierungs-Rephosphorylierungs-Gleichgewicht. [Reactivation of *O,O*-diethylphosphoryl-acetylcholinesterase. Reactivation-rephosphorylation equilibrium.]** *Biochem. Pharmacol. 21(2): 163-170; 1972.* (22 references) (German)

Acetylcholinesterase, inhibited by *O,O*-diethyl-*O,p*-nitrophenylphosphate (paraoxon), was reactivated with pyridinium oximes. The reaction reached an equilibrium, indicating that simultaneously with the reactivation process, the free enzyme becomes rephosphorylated by the produced phosphoryl oxime. From the concentrations of the reactants in the equilibrium the equilibrium constants were calculated. Kinetical treatment of the reaction course yielded the rate constants of reactivation and rephosphorylation. After equilibrium has been reached, a further slow increase of enzymatic activity indicates the decomposition of the phosphorylated oxime. From the time course of this consecutive reaction the rate constant for decomposition of the phosphoryloximes could be calculated. The phosphoryloximes of potent reactivators such as toxogonin and TMB-4 proved to be up to ten times stronger anticholinesterases than paraoxon. The decomposition rate constants of these compounds are in the range of 10^{-2} min^{-1}. (Author abstract by permission)

72-1271. Murakami, Y.; Murakami, K.; Makino, K. (Dept. of Biochemistry, Jikei U. School of Medicine, Minato-Ku, Tokyo, Japan). **On the convulsive action of castrix.** *Biochem. Pharmacol. 21(2): 277-280; 1972.* (14 references)

In an attempt to elucidate the mechanism of the convulsive action of castrix, the effects of castrix and its analogs on several enzymes, their convulsive effects in mice, and the influence of other compounds on the convulsive effects of castrix were investigated. At high concentrations *in vitro*, castrix inhibited the activities of mouse brain pyridoxal kinase, glutamic decarboxylase, and acetylcholinesterase. The activities of these enzymes were not significantly altered by castrix *in vivo*. Several structural analogs of castrix displayed similar convulsive activity in mice. The elimination of chlorine from castrix changed the mode of convulsive action, and the convulsions in this case could not be prevented by administration of vitamin B6. Replacing the 4-dimethylamino group of castrix with an amino group eliminated the convulsive action but gave a depressive action. The mechanism by which castrix competes with vitamin B6 was not found, since other vitamin B6 antagonists (e.g., toxopyrimidine) protected against the convulsive action of castrix. Subtoxic doses of 4-deoxopyridoxine and semicarbazide also had a protective effect; isonicotinylhydrazine, caffeine, and acetazolamide were partially effective in preventing convulsions due to castrix.

72-1272. Brestkin, A. P.; Mayzel', Ye. B.; Rozengart, Ye. V. (I.M. Sechenov Inst. Evolutional Physiology and Biochemistry of the USSR Acad. of Sciences, Leningrad, USSR). **Vzaimodeystviye gidrophobnykh fosfororganicheskikh ingibitorov s syvorotochnoy kholinesterazoy v prisutsvii alifaticheskikh spirtov pri raznykh pH. [Serum cholinesterase interactions with hydrophobic organophosphorus inhibitors in the presence of aliphatic alcohols under varying pH conditions.]** *Biokhimiya 36(6): 1229-1233; 1971.* (7 references) (Russian)

The anticholinesterase activity of two series of hydrophobic organophosphorus inhibitors, referred to as $LG[C_2H_5O(CH_3)P(O)S(CH_2)_nC(CH_3)_3]$ and $GA[C_nH_{2n+1}O(C_2H_5)P(O)SC_4H_9]$, was studied in the presence of 0.54 *M* isopropyl-, *n*-butyl-, or isobutyl alcohol at pH values ranging from 5.0 to 9.5. A bell-shaped graph of anticholinesterase activity as a function of pH with a plateau between pH 7.5 and 9.0 was ascertained. Both the anionic and esterasic hydrophobic segments of the active site of cholinesterase were equally affected by the presence of the studied alcohols throughout the pH range. The hydrophobic interactions between the alkylic constituents of the studied organophosphorus inhibitors and the nonpolar regions of the active site of cholinesterase appear to be affected by the above alcohols. The pH variations seem to be reflected essentially in the reactivity and mutual orientation of the hydrophilic groups of the catalytic site of the enzyme.

72-1273. Walsh, G. M. (Oregon State U., Corvallis, OR). **A pharmacologic and toxicologic comparison of two isomeric chlorinated hydrocarbon insecticides: endrin and dieldrin.** *Diss. Abstr. Int. 32(4): 2316-B; 1971.*

Various aspects of the toxicity of endrin and dieldrin were compared after intravenous administration in mice and dogs. At equimolar doses, the toxic effects of endrin are appreciably more severe and sudden than

those of dieldrin. When the compounds are given in equilethal doses, dieldrin is faster-acting. The ultimate lethal effects of endrin and dieldrin are relatively unaltered by variations in ambient temperature or aggregation of animals, but are reduced by induced hypothermia. The rates of action are somewhat affected by ambient temperature, especially in the case of endrin. The seizure patterns induced by these two compounds are similar, and resemble those of picrotoxin. Tissue concentrations 5 min after administration align as liver > brain = fat > blood. Endrin administration at a lethal dose is followed by marked hypertension, then terminal hypotension. Endrin produces blood-pressure oscillations and antagonizes noradrenaline and tyramine effects, whereas dieldrin does not display these effects even at a three-times-higher dose. The differences observed suggest that endrin has a greater intrinsic activity and/or affinity for the active site in the central nervous system than dieldrin, and may possess alpha-adrenergic blocking properties. (From author abstract, by permission, copies of the thesis are available from University Microfilm, Order No. 71-25, 335)

72-1274. Gibson, J. R. (Mississippi State U., State College, MS). **Comparative biochemistry of parathion metabolism in three species of fishes.** *Diss. Abstr. Int. 32(4): 2365-B; 1971.*

Golden shiners (*Notemigonus crysoleucas*), green sunfish (*Lepomis cyanellus*) and bluegill sunfish (*Lepomis macrochirus*) were examined for variation in their ability to metabolize parathion, and for the effect of mixed function oxidase (MFO) inhibitors upon the toxicity and metabolism of parathion. The toxicity of parathion was found to be 0.931, 0.155 and 0.141 ppm (24-hr LC50) for shiners, green sunfish and bluegills respectively. Pretreatment with sesamex (2 ppm for 24 hr) altered 24-hr LC50 values 7.95, 5.78 and 0.85-fold for green sunfish, bluegills and shiners respectively. SKF-525A pretreatment (1 ppm for 24 hr) altered 24 hr LC50 values by 5.33, 2.54 and 0.81-fold respectively for the three species. Golden shiners have higher brain AChE activity and metabolize parathion at a slower rate, and thus are more tolerant of parathion than either green sunfish or bluegills. The metabolism of parathion varies considerably among species of fishes. The mixed function oxidase varies considerably among species of fishes. The mixed function oxidase inhibitors sesamex and SKF-525A significantly alter parathion metabolism (activation and detoxication), but the nature and extent of action depends upon the species. The effect of MFO inhibitors upon LC50 (i.e., toxicity) is not predictable and does not always correlate with the results of metabolic studies. (Author abstract by permission, copies of the thesis are available from University Microfilms, Order No. 71-27,040)

72-1275. Hybertson, R. L. (Iowa State U., Ames, IA). **Biochemical and cytological aspects of *in vitro* metabolism of parathion by rat liver cell fractions.** *Diss. Abstr. Int. 32(4): 2443-B; 1971.*

Of the six cell fractions (liver homogenate, centrifugally prepared debris, mitochondrial, crude microsomol, rough microsomal and smooth microsomal) prepared from the livers of laboratory rats, the smooth microsomal fraction displayed the highest specific metabolic activity toward parathion response ratio for both paraoxon production and aqueous metabolite production was 1.4:1. After adjusting the nitrogen level in the specific activity calculations to exclude the contribution by the ribosomal component, the ratio was 1.2:1. A pH of 7.5 and a temperature close to the physiological body temperature of the rat were optimal for parathion-metabolizing activity. The specific activity of crude microsomes decreased with increasing concentration over the range of 0.3 to 3.1 mg protein/ml incubation mixture. Parathion metabolism was not linear with time. Microsomal activity was retained after storage at -20°C for six weeks, but destroyed by several solubilization techniques. (From author abstract, by permission. Copies of the thesis are available from University Microfilms, Order No. 71-25,414)

72-1276. Jarabak, J.; Street, M. A. (Fisher Endocrine Lab., Dept. of Medicine, Pritzker School of Med., U. of Chicago, Chicago, IL 60637). **The inhibition of the soluble human placental 17 β-hydroxysteroid dehydrogenase by *o,p'*-DDD and its analogs.** *Endocrinology 89: 1407-1411; 1971.* (21 references)

Both the interconversion of 17β-estradiol and estrone and the transhydrogenation between pyridine nucleotides, catalyzed by the 17β-hydroxysteroid dehydrogenase from human placenta, may be inhibited by a variety of substances. Most of these are either estrogenic or antiestrogenic materials. However, *o,p'*-DDD, which is neither estrogenic nor antiestrogenic *in vivo*, has been found to be a highly potent inhibitor of both of these reactions *in vitro*. It is more potent in this respect than those of its stereoisomers which were tested, and more potent than the other non-steroidal estrogens and antiestrogens examined. Both *o,p'*-DDD and diethylstilbestrol compete for the same 17β-estradiol binding site of the enzyme studied. The structural similarities between *o,p'*-DDD and 17β-estradiol as well as certain synthetic antiestrogens are pointed out; however, the reasons for the marked difference between the *in vitro* effects of *o,p'*-DDD and its lack of a estrogenic or antiestrogenic activity *in vivo* are unclear. The findings suggest that in addition to affecting estrogen hydroxylation, *o,p'*-DDD and its analogs might act at another site(s) in estrogen metabolism.

72-1277. Vorob'yeva, N. M.; Lapchenko, V. S. (Kiev Research Inst. for Nutritional Hygiene, Kiev, USSR). **K gigiyenicheskomu normirovaniyu predel'no dopustimykh kolichestv pestitsida antio. [Development of hy-**

gienic criteria for establishing the maximum allowable amounts of antio (formothion).] *Gig. Sanit. 37(1): 35-37; 1972.* (Russian)

Intragastric administration of formothion indicated an LD50 of 83.3 ± 10.3 mg/kg in mice, 218 ± 75.4 mg/kg in cats and of 310 ± 40.8 mg/kg in white rats. The compound appeared to exhibit slight cumulative properties upon repeated administration of 0.1, 0.2 and 0.5 LD50 to rats and cats during a 2-month experiment. Chronic toxicity was studied in rats following p.o. treatment with 6.2, 3.1, 1.55, 0.77, and 0.38 mg/kg daily for 10 months. Serum, erythrocyte, liver and brain cholinesterase activities decreased by 35.8, 40.9, 54.4, and 26.8% respectively, following 10 days of treatment at 6.2 mg/kg. Groups receiving 6.2, 3.1, and 0.38 mg/kg of formothion exhibited reductions in brain cholinesterase of 52.6, 33.6 and 22.3% respectively, at the end of the experimental period. Dose-dependent decreases in liver detoxifying capability (hippuric acid synthesis under Quick's test conditions) and in albumin were noted, along with augmented serum albumin levels and diminished γ-globulin fractions. Decreased vitamin C levels in liver, kidney and adrenals indicated the involvement of this vitamin in the acetylcholine excess detoxication process. Since the toxic effects of formothion appear to begin at 0.38 mg/kg, the establishment of the maximum allowable residue level in food products at 0.2 ppm is recommended.

72-1278. Kozhinova, L. A.; Malakhova, A. V.; Grigor'yeva, T. I. (A.N. Sysin Inst. of General and Communal Hygiene, Moscow, USSR). **K gigiyenicheskoy otsenke polykhlorpinena i produktov, obrabotannykh etim insektitsidom. [The hygienic evaluation of polychloropinene and of food products treated with this insecticide.]** *Gig. Sanit. 37(1): 109-110; 1972.* (2 references) (Russian)

Chronic administration of 1 mg/kg polychloropinene to white rats led to decreased urinary hippuric acid levels (following Quick's test) after 7 mo treatment. Increased amounts of vitamin C in the adrenals and decreased amounts in the liver were found along with nuclear polymorphism of the hepatic cells. Deterioration of the lymphoid tissue in the spleen and morphological damage to the kidney were also observed. Application of 6 kg/ha polychloropinene to potato and beet cultures produced no alterations to the organoleptic properties. Residual amounts of 0.5 to 1.0 mg/kg polychloropinene were found 4 mo after application, and feeding these products to rats (over an 8 mo period) produced no damage.

72-1279. Camougis, G.; Davis, W. M. (New England Research, Inc., Worcester, MA). **A comparative study of the neuropharmacological basis of action of pyrethrins.** *Pyrethrum Post 11(1): 7-14; 1971.* (26 references)

The effects of pyrethrins on isolated nerves from arthropods and vertebrates were investigated. Pyrethrins were found to produce excitation followed by block at concentrations from 0.2 to 20 μg/ml with little or no reversibility in crayfish ganglia. In peripheral nerve, 0.2 to 2 μg/ml caused block, with poor recovery at the higher concentration. Frog peripheral nerve was only partially blocked by concentrations from 0.0002 to 0.2%, with no dose response. High frequency failure was marked and recovery was poor. Pyrethrins were found to be inactive at concentrations up to 0.2% on rat peripheral nerve. A standard blocking agent, lidocaine, showed less activity than pyrethrins in arthropods and greater activity with good recovery in the vertebrates. Desheathed nerves showed a greater response to lidocaine, but an equal response with pyrethrins. Results in *in vivo* experiments were consistent with isolated nerve studies. Immediate excitation and convulsions were seen in crayfish following relatively high doses of pyrethrins, and low doses resulted in increased heart rate followed by block and death. Up to 1000 mg/kg intramuscularly produced little effect in the frog. It appears that nerves bind the lipid-soluble pyrethrins very strongly, and it is possible that vertebrate nerve fibers may be protected from the action of the insecticide through its storage in the myelin compartments. Acute toxicity of pyrethrins in vertebrates seems to be low. Although accumulation in fatty tissue may produce chronic toxicity, the literature gives evidence of high metabolism and elimination rates in mammals.

72-1280. Shishido, T. (National Inst. of Agricultural Sciences, Nishigahara, Kita-ku, Tokyo, Japan). **Mode of action organophosphorus insecticides.** *Shokubutsu Boeki (Plant Protect.) 26(3): 98-102; 1972.* (5 references) (Japanese)

Recent studies on the mode of action of organophosphorus insecticides are reviewed, with emphasis on the selective effects in insects and higher animals. One of the reasons for this selectivity lies in the difference in susceptibilities of various acetylcholinesterases to the insecticides. The rate and products of metabolism of organophosphorus insecticides also greatly affect the selective toxicity. Higher animals detoxify organophosphates by hydrolysis of the phosphoric ester linkage of paraoxon by arylesterase in serum and liver, oxidative cleavage of parathion by microsomal oxidase in the liver, and conjunctive cleavage of the P-O-methyl linkage by glutathione transferase. The recent findings of the author on the cleavage of the P-O-pyrimidine linkage in diazoxon revealed the participation of three kinds of enzymes: arylesterases, microsomal oxidative enzymes, and glutathione transferase. Demethylation is especially important in the detoxification of organophosphorus insecticides in higher animals. Insects are also capable of detoxifying organophosphorus insecticides to some extent.

72-1281. Iwasaki, I. (Internal Medicine II, Faculty of Medicine, Okayama U., Okayama-shi, Japan). **Toxi-**

cology of organophosphorus pesticides. *Shokubutsu Boeki (Plant Protect.) 26(3): 115-124; 1972.* (24 references) (Japanese)

Since its introduction in 1951, parathion has contributed significantly to the development of modern agriculture in Japan. However, because of its high mammalian toxicity and the development of other insecticides with lower toxicity, the use of parathion and methyl parathion was banned in June, 1971. The acute toxicity in laboratory animals, estimated lethal doses in man, selective toxicity ratios (mouse/housefly) and synergistic toxicities of registered organophosphorus insecticides are reviewed. Lesions due to organophosphorus insecticides are primarily localized in the nervous system; however, more information is required on the harmful effects of these compounds on the fetus. Although acceptable daily intake levels have been established for a number of organophosphorus insecticides, their chronic toxicity has not been sufficiently studied. Common names, trade names, chemical formulas, commercial formulations, and toxicity data for 38 organophosphorus insecticides used in Japan are summarized in a table.

72-1282. Schuphan, I.; Ballschmiter, K. (Institut fuer Anorganische Chemie und Kernchemie der Universitaet Mainz). **Metabolismus von Hexachlorbicyclo-(2.2.1)-hept-2-en: Abbau des polychlorierten Geruestes durch *Clostridium butyricum*. [Metabolism of hexachlorobicyclo-(2.2.1)–hept-2-ene: degradation of the polychlorinated skeleton by *Clostridium butyricum*.]** *Z. Pflanzenkr. Pflanzenphysiol. Pflanzenschutz 79(1): 23-26; 1971.* (12 references) (German)

The degradation of the polychlorinated skeleton occurring in the cyclodiene insecticides such as aldrin, dieldrin, endrin and endosulfan by microorganisms was studied, using 1,2,3,4,7,7-hexachlorobicyclo-(2.2.1)-hept-2-ene and its derivatives formed by removal of one or both of the geminal chlorine atoms on the methylene bridge. Six compounds considered as potential metabolites were synthesized. The starting compounds were added to nutrient media inoculated with *Clostridium butyricum*, and after incubation at 25°C for ten days, the medium was extracted with toluene and examined chromatographically for the formation of metabolites. Three metabolites were identified when the hexachloro compound was used as the starting material: 7,7-dihydro-1,2,3,4-tetrachlorobicyclo-2,2,1-heptene (A), 7-*s*-hydro-7a-hydroxy-1,2,3,4-tetrachlorobicyclo-(2.2.1)-heptene (B), and 1,2,3,4-tetrachlorocyclohexadiene (C). Compound C was only formed when the hexachloro compound was used as the starting material, suggesting that it is either formed directly from the hexachloro compound or by way of an unidentified intermediate. Dechlorination products of the hexachloro compound were not found either in highly aerated *Saccharomyces* cultures or in cultures of soil microorganisms (primarily actinomycetes) on agar plates.

72-1283. Naumann, K. (Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Institut fuer Phytopathologie, Aschersleben, Germany). **Zur Dynamik der Bodenmikroflora nach Anwendung von Pflanzenschutzmitteln. VII. Die Wirkung einiger Entseuchungsmittel auf die Bodenmikroorganismen. [Dynamics of soil microflora after adding pesticides. VII. The effect of some fumigants on soil microorganisms.]** *Zentralbl. Bakteriol., Parasitenk., Infektionskr. Hyg. Abt. 2. 125(5): 478-491; 1970.* (46 references) (German)

When applied to the soil in the standard fumigant dosages, Vapam (metham) (0.15%) and Mylone (dazomet) (250 ppm) produced immediate and continuous stimulation of soil bacterial growth for 12 weeks. Actinomycetes showed slight stimulation, whereas denitrifying bacteria, soil algae, *Azotobacter chroococcum* and some soil fungi underwent a reduction in growth. Normal doses of allyl alcohol (200 ppm) stimulated soil bacteria but did not affect the actinomycetes. Many bacteria showed initial inhibition with allyl alcohol, especially in dry soil, followed by stimulation, especially of nitrogen-fixing, anaerobic and ammonifying bacteria. Soil algae and fungi were reduced. Application of a 30% formalin preparation at 0.2% decreased bacteria and actinomycetes slightly at the outset, followed by stimulation. Most of the physiological groups were depressed after formalin application in dry soil, but showed stimulation after several weeks in the presence of moisture. Denitrifying bacteria, soil algae and soil fungi were inhibited for varying lengths of time after formalin application. The soil dehydrogenase activity was reduced by vapam, mylone and formalin, but increased by allyl alcohol.

72-1284. Naumann, K. (Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Institut fuer phytopathologie, Aschersleben, Germany). **Zur Dynamik der Bodenmikroflora nach Anwendung von Pflanzenschutzmitteln. VIII. Versuche mit den Krautspritzmitteln Natrium-trichlorphenolat und Natrium-aethylxanthogenat. [Dynamics of soil microflora after adding pesticides. VIII. Experiments with the defoliants sodium trichlorophenolate and sodium ethylxanthogenate.]** *Zentralbl. Bakteriol. Parasitenk., Infektionskr. Hyg. Abt. 2, 125(5): 492-504; 1970.* (14 references) (German)

At 50 and 500 ppm, sodium ethylxanthogenate, proposed for use as a defoliant, acted in a highly stimulatory manner on all groups of soil microbes with the exception of the soil fungi and *Azotobacter chroococcum*, in both loam and sandy soil. The reference substance, sodium trichlorophenolate, at 500 ppm exerted a stimulatory effect only in loam, but had an inhibitory effect in sand, especially on the actinomycetes. Initially, sodium trichlorophenolate also damaged most of the physiological groups, especially the protein-degrading, nitrifying and cellulose-degrading bacteria. *A. chroococcum* and the soil algae were markedly inhibited by both preparations, and the fungal flora was also decimated.

Applied at 50 ppm, sodium ethylxanthogenate produced a greater increase in soil respiration than sodium trichlorophenolate, but a brief reduction in the respiration rate occurred at the beginning. Glucose respiration was retarded.

72-1285. Faina, L.; Fattori, G.; Pirotta, M.; Porcellati, G. (Istituto di Chimica Biologica della facolta di Medicina e Chirurgia dell'Universita di Perugia, Perugia, Italy). **Le attivita peptido-peptido idrolasiche del nervo periferico nella degenerazione mielinica secondaria indotta da sostanze organofosforiche (DFP). [Organophosphorus compound (DFP)-induced secondary demyelination: peptido-peptido hydrolase activities of the peripheral nerve.]** *Acta Neurol. 26: 243-245; 1971.* (4 references) (Italian)

Acid and neutral sciatic nerve protease activities in cats were studied 4 and 16 days after DFP administration. Acid peptidase activity was considerably increased in nerve fractions purified following sedimentation at 6,000 to 15,000 rpm; such increases were not observed in myelin fractions. Neutral peptidases were enhanced in fractions referred to as P_2, A and B. Fraction P_2 was a heterogeneous fraction, which was utilized for the preparation of fractions A (myelin), B (nerve endings, membranes, vesicles), C (mitochondria, lysosomes), and P_3 (another myelin fraction). The above data appear to reflect variations occurring at specific morphological structure levels of the demyelinating peripheral nerve.

72-1286. Arienti, G.; Gaity, A.; De Medio, E.; Giorgini, D.; Porcellati, G. (Istituto di Chimica Biologica della Facolta di Medicina e Chirurgia dell'Universita di Perugia, Perugia, Italy). **Scambio di fosfolipidi in membrane di tessuto nervoso centrale e periferico ed effetto della degenerazione mielinica secondaria da sostanze organofosforiche. [Phospholipid metabolism of central and peripheral nerve tissue membranes and effect of organophosphorus compound-induced secondary demyelination.]** *Acta Neurol. 26: 246-259; 1971.* (4 references) (Italian)

Incubation of chicken brain microsomal membranes with radiolabeled L-serine showed 90% of the radioactivity to be incorporated into phosphatidylserine. A low percentage of the total radioactivity was found in phosphatidylethanolamine, probably as a result of phosphatidylserine decarboxylation. Brain microsomal membrane incubation with labeled ethanolamine (^{14}C in the 1- and 2-positions) resulted in incorporation of almost all of the radioactivity into phosphatidyl ethanolamine. Small amounts of radioactivity were detected in plasmalogen ethanolamine. Ethanolamine incorporation, as promoted by enzymatic transfer reactions occurring within the brain microsomes, was inhibited by L-serine and by choline (to a much lesser extent), and was not affected by D-serine, inositol or carnitine. Apparently, the transfer enzyme system has a common active site for both L-serine and ethanolamine. The phosphatidylserine synthesis promoting transferase system appeared to be present at peripheral nerve structure levels as well (chicken sciatic nerve); the enzyme system was not affected by DFP administration. This preservation of the catalytic integrity of the transferase system seems to offer a starting point for recovery of the injured peripheral nerve structure. As opposed to other phospholipids, phosphatidylserine synthesis appears to undergo no alteration at peripheral structure levels after administration of organophosphorus compounds.

72-1287. Zinchenko, V. A. (Author address not given). **Pogloshcheniye, peredvizheniye i metabolizm proizvodnykh triazina v rasteniyakh. [Absorption, circulation and metabolism of triazine derivatives in plants.]** *Agrokhimiya 8: 141-152; 1971.* (73 references) (Russian)

An attempt to summarize the available data on the absorption, distribution and metabolism of triazine derivatives such as atrazine, propazine, chlorazine and methoxy- or methylmercapto- triazine derivatives in plants is presented. Triazine derivatives can enter the plant via roots or exposed parts; circulation occurs acropetally and diffusion reaches the intercellular membrane level; no penetration into the live symplast has been observed so far. Absorption and distribution of the herbicide depends on the plant species. Both herbicide-resistant and -susceptible plants can absorb large amounts of triazine derivatives; the herbicide levels found in herbicide-resistant plant species are lower than in the susceptible species. Atrazine was found to accumulate at leaf edges in atrazine-susceptible plants. No correlations between plant susceptibility and amounts of absorbed herbicide could be established. Decreased atmospheric temperatures and increased herbicide concentrations occurring in the nutrient solution increase the critical concentration of the herbicide. Triazine derivatives undergo dechlorination, dealkylation, deamination and hydrolysis of the triazine ring, thus yielding non-phytotoxic products which can be included into the usual metabolic pathways of the plant.

72-1288. Lutz, H.; Lutz-Ostertag, Y. (Complexe scientifique des Cezeaux, Biologie Animale, Aubiere, France). **Action de l'Azinphos (insecticide organo-phosphore) sur l'embryon de faisan, de perdrix grise et de perdrix rouge. [The action of azinphos (Gusathion), an organophosphorus insecticide, on pheasant, grey- and red-legged partridge embryos.]** *Bull. Soc. Zool. Fr. 92(2): 265-273; 1971.* (10 references) (French)

Azinphos methyl [Gusathion, *O,O*-diethyl-*S*-(4-oxobenzotriazine-3-methyl)dithiophosphate] was sprayed on the eggs before and three days after incubation of pheasant (*Phasianus colchicus* L.) red-legged partridge (*Alectoris rufa* L.) and common partridge (*Perdix perdix* L.). The dose applied corresponded to 0.7 to 1

l/ha. The embryos were examined between the 18th and 22nd days. The mortality was considerable during the first days of development. Although the size of the embryos was normal, the feet were paralyzed in about 50%, and lordosis was observed in 30%. In male embryos, the development of the genital duct was disturbed, with mullerian ducts more or less maintained, and varying numbers of mullerian nodules (2 to 8). The testicles were small, thin, of irregular shape, and covered with protuberances, as well as filiform and atrophic in some cases. Sterility or reduced fertility, and in some cases second-degree intersexuality were observed. In female embryos, which generally appeared normal, flat ovaries with cortex abnormal or missing were revealed. Normal histogenesis was found in about 50%. Vacuolated germinal cellules, and, in some cases, Pflueger's tubes with normal or reduced number of gonocytes were observed. The right muellerian duct was above normal in about 30%. Four categories were distinguished; sterility, reduced fertility, starting reduction of fertility on the 20th to 22nd days, and embryos still normal on the 19th day of development.

72-1289. Lutz-Ostertag, Y.; Kantelip, J. P. (Biologie Animale, Universite de Clermont-Ferrand, B.P. 45,63-Aubiere, France). **Action sterilisante de l'Endosulfan (thiodan) (insecticide organochlore) sur les gonades de l'embryon de Poulet et de caille in vivo et in vitro. [Sterilizing effect of endosulfan (thiodan) (organochlorine pesticide) on chicken and quail embryonic gonads *in vivo* and *in vitro*.]** *C. R. Soc. Biol. 165(4): 844-848; 1971.* (French)

Embryotoxic effects of endosulfan in chicken and quail (*Coturnix coturnix japonica*) were studied. Applying four different techniques (endosulfan injection into the embryonic heart or the egg air chamber, immersion of eggs in 0.1% or 0.2% solution of endosulfan, and gonad cell culture in 0.1 g/100 ml endosulfan-containing medium), gave identical results. The mortality was found to be 15 to 28% for chicken and 15 to 20% for quail embryos. Teratogenesis was observed in 1 to 2%. Anomalies of the urogenital tract were observed. Hypertrophy of the mesonephric tubules was found in many cases. Chicken embryo testicles were both small and granular. Thick and vacuolated albuginea, and absence of pycnosis of gonocytes were revealed. Visible gonocyte clusters and reduced numbers of gonocytes were found in male quail embryos. Chicken embryo ovaries were flat and narrow, or of irregular thickness, with absence or degeneration of Pflueger's tubes. Abnormal mitoses and absence and degeneration of the cortical structure were observed. Normal ovaries were found in 2%. The right muellerian duct was one third to one half the size of the left in about 50%. As in the chickens, sterile cortex, absence of Pflueger's tubes and degeneration of the gonocytes was revealed in female quail embryos. Hypertrophic, thick and vacuolated albuginea, mitotic anomalies and reduced number of gonocytes were revealed in *in vitro* cultures. Endosulfan was found to be of moderate toxicity, and not to be teratogenic in the doses applied. However, it caused total or quasi-total sterility.

72-1290. Brestkin, A. P.; Brik, I. L.; Volkova, R. I.; Godovikov, N. N.; Gurdaliyev, Kh. Kh.; Kabachnik, M. I.; Kardanov, N. A. (I.M. Sechenov Inst. Evolutional Physiology and Biochemistry, USSR Acad. of Sciences, Leningrad, USSR). **Kombinirovannoye tormozheniye kholinesterazy iz syvorotki krovi loshadi efirami difenilfosfinovoy i difeniltiofosfinovoy kislot. [Combined-type inhibition of horse serum cholinesterase by diphenylphosphinic and diphenylthiophosphinic acid esters.]** *Dokl. Akad. Nauk SSSR 200(1): 103-106; 1971.* (6 references) (Russian)

The simultaneous occurrence of two kinds of acetylcholinesterase inhibition by organophosphates, one, irreversible and progressive, due to the phosphorylation of the active site; and the other, reversible and attributed to the formation of a reversible complex between the inhibitor and a portion of the active site surface, is known as combined-type inhibition. In search for additional evidence for this type of inhibition, horse serum butyrylcholinesterase was exposed to several diphenylthiophosphinate and diphenylphosphinate derivatives utilizing acetylcholine as a substrate. The thiophosphinates appeared to be strong butyrylcholinesterase inhibitors of the combined type. Their bimolecular rate constants were close to those known for *O*-ethyl-methylthiophosphonic acid derivatives. Their inhibition constants appeared to be one order of magnitude lower than those corresponding to their oxygen-containing analogs, known to be reversible type inhibitors only. The reversible inhibition by thiophosphinates appeared to be competitive. Diphenylphosphinates produced only reversible butyrylcholinesterase inhibition, which was tentatively attributed to steric hindrance, preventing the formation of a stable Michaelis EI complex.

72-1291. Kravtsova, O. L.; Korenevs'kyy, L. I.; Reznikov, O. H. (Kiev Endocrinology and Metabolism Research Inst. Kiev, USSR). **Vplyv *o,p'*-DDD na rozvytok indukovanoho DMBA raka molochnykh zaloz ta funktsiyu kory nadnyrnykiv u shchuriv. [The influence of *o,p'*-DDD on the development of DMBA–induced mammary gland tumors and adrenal cortex function in rats.]** *Dopov. Akad. Nauk Ukr. RSR, Ser. B 30(10): 943-945; 1971.* (8 references) (Ukrainian)

The effect of *o,p'*-DDD (TDE) on the development of 9,10-dimethyl-1,2-benzanthracene (DMBA)-induced mammary gland tumors and on the carcinogenesis-related functional alterations of the adrenal cortex was studied in rats. Female albino rats developed tumors 1.5 to 2 months following four weeks of i.v. treatment with DMBA. After the last injection of DMBA, the rats were distributed into 3 groups: one group served as a control, one group started receiving TDE 2 wk and the third

group started treatment with TDE 6 wk after the last carcinogen administration. TDE was given at 600 mg/kg/day as a 20% preparation in corn oil p.o. for 4 wk. The functional condition of the adrenal cortex was evaluated on the basis of the plasma corticosterone levels and of its variations upon administration of ACTH. Rats receiving TDE at both early and late stages of carcinogenesis revealed a much lower tumor incidence than the controls. No differences in the latency period between control and TDE-treated rats were observed. The response to ACTH appeared to be normal, and the tumor-induced activation of adrenocortical function appeared to be inhibited in both TDE-treated groups. It is assumed that the antineoplastic activity of TDE is not related to the inhibition of adrenocortical function, but that it is due to a direct cytostatic action.

72-1292. Bjoerklund, N. E.; Erne, K. (Dept. of Pathology, Royal Veterinary College, Stockholm, Sweden). **Phenoxy-acid-induced renal changes in the chicken. I. Ultrastructure.** *Acta Vet. Scand. 12(2): 243-256; 1971.* (22 references)

Administration of 1000 ppm 2,4-D or 2,4,5-T in the drinking water to broiler chicks from the fifth day to the seventh month of life resulted in the development of renal changes. These changes were reversible, as indicated by their disappearance following cessation of administration at the 8-week point. As early as the 14th day of exposure, the kidneys were visibly altered, and epithelial hypertrophy of the proximal convoluted tubules was observed under the light microscope. Progressive changes were observed in the proximal convoluted tubular cells under the electron microscope, consisting of the development of nuclear bodies in the nuclei, and in the cytoplasm increased mitochondrial numbers and pleomorphism as well as development of microbodies. As exposure progressed, the nuclear bodies tended to become larger and irregular, and the mitochondria became elongated and formed circular arrays around various organelles or fused into almost structureless bodies. The changes after 2,4,5-T were more severe than those after 2,4-D.

72-1293. Nachtomi, E.; Alumot, E. (Div. of Animal Nutrition, Volcani Inst. of Agricultural Research, Rehovot, Israel). **Comparison of ethylene dibromide and carbon tetrachloride toxicity in rats and chicks: blood and liver levels; lipid peroxidation.** *Exp. Mol. Pathol. 16(1): 71-78; 1972.* (22 references)

Following oral administration of ethylene dibromide (EDB) at 110mg/kg to rats and chicks and 4.4 and 6.6 g/kg of carbon tetrachloride (CTC) to rats and chicks, respectively, differences were observed in EDB and CTC levels and elimination rates, which may explain the difference in hepatotoxicity observed between the species. Rat liver appears to have an efficient detoxification mechanism for EDB, since the pool size of each compound was the same, but the elimination rate of EDB was four times greater than that of CTC. Elimination of each from the blood in the rat was similar. In chicks, elimination rates were similar but the pool size of EDB was about seven times that of CTC. In rats the liver pool size (% dose) of CTC was 0.367 while in chicks it was 0.022. EDB liver pool size values were 0.300 in rats and 0.160 in chicks. Liver triglycerides were evaluated in rats 12 hrs following EDB treatment, but to an extent less than that reported for CTC. Chick liver lipids did not show diene formation with either poison, although rat liver lipids had the expected diene formation with CTC and a lower level with EDB. Administration of haloalkanes may result in formation of conjugated double bonds, but it is not related to their degree of toxicity.

72-1294. Franchetti, P.; Grifantini, M.; Lucarelli, C.; Stein, M. L. (Universita di Camerino, Istituto di Chimica Farmaceutica e di Chimica Organica, Camerino, Italy). **Relazioni struttura-attivita nei riattivatori dell' acetilcolinesterasi inibita da composti organofosforici. Nota IV. *N*-idrossiimidazol-3-ossidi e loro sali quaternari. [Structure-activity relationships of organophosphorus-inhibited acetylcholinesterase activators. Note IV. *N*-hydroxyimidazole-3-oxides and their quaternary salts.]** *Farmaco, – Ed. Sc. 27(1): 46-59; 1972.* (15 references) (Italian)

A series of *N*-hydroxyimidazole-3-oxide derivatives was prepared for use as molecular models in the reactivation of DFP- or TEPP-inhibited acetylcholinesterase *in vitro*. The imidazole derivative model was chosen because of the well-defined, constant distance existing between its nucleophilic nitrogen heteroatoms, and the cationic site of the ring. This makes it possible to obtain certain information on the structure-activity relationships in the process of enzyme recovery. The hydroxyl group in position one has a dissociation constant hich provides a high anion availability for the attack of the phosphorylated site of the inhibited enzyme. The distance between the dipolar, partially cationic N>O group, and the N–OH group (which are involved in the enzyme recovery reaction) is close to that occurring between the quaternary nitrogen and the ester oxygen of the quasi-cyclic acetylcholine. Only minor enzyme reactivation effects could be attained with 1-hydroxyimidazole-3-oxide or hydrochloride. Presence of a pyridine ring in position 5 of the imidazole reduced the enzyme recovery effect to zero, which was attributed to steric hindrance. Substitution with quaternary nitrogen salts at positions 2 and 5 led to compounds which had no reactivation effects. Apparently, the presence of two cationic centers in the same molecule leads to enzyme – molecule interactions in which the nucleophilic group is too far from the phosphorylated enzyme site; thus no reactivation of the enzyme can occur.

72-1295. Tron'ko, M. D.; Kravchenko, V. I. (Kiev Inst. of Endocrinology and Metabolism, Laboratory of Patho-

logical Physiology, Kiev, USSR). **Vplyv *o,p'*-DDD na zv"yazuval'nu zdatnist' transkortynu u sobak, shchuriv, mors'kykh svynok i kurchat. [The effect of *o,p'*-DDD on transcortin activity in dogs, rats, guinea pigs, and chickens.]** *Fiziol. Zh. (Kiev) 17: 245-247; 1971.* (17 references) (Ukrainian)

The inhibitory action of *o,p'*-DDD on steroid hormone metabolism in dogs, rats, guinea pigs and chickens was studied via the reactivity of the corticosteroid-binding globulin, transcortin. Male dogs and rats were fed a diet containing 50 mg/kg body weight of the compound; guinea pigs and chickens received 100 mg/kg body weight of *o,p'*-DDD. Analytical determinations were performed after 8 to 12 days of treatment. Treatment with *o,p'*-DDD increased the binding activity of transcortin in dogs; the amount of bound plasmatic hydrocortisone increased from 11.6% (initial figure) to 15.4%; 11-hydroxycorticosteroid synthesis was decreased; plasmatic protein levels were unaltered. Plasma transcortin appeared to be constant in rats, guinea pigs and chickens. Corticosteroids were decreased in chicken plasma and unaltered in rat and guinea pig plasma. Apparently, the binding activity of transcortin seems to be affected only in the animal species which are susceptible to the adrenocorticolytic action of *o,p'*-DDD.

72-1296. Yoshida, Y.; Okamura, T.; Kajiwara, M.; Iwasaki, N. (School of Medicine, Osaka University, Osaka, Japan). **[Absorbability of aerosol pesticides via trachea.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 27(1): 107; 1972.* (Japanese)

The possibility of pesticide aerosol intake through the respiratory system is examined. Lindane in aerosol form was sprayed in a laboratory, and the absorption rate into the plasma of human beings and rabbits was measured, and organs of mice were examined. The measurements were taken by the AOAC and Mills methods, and ECD gas chromatography was used for the analyses. Immediately after exposure to BHC and DDT aerosol, corresponding peaks were found in human and rabbit plasma. However, the result of exposure to an aerosol for five seconds daily in a $10m^2$ Japanese-style room for two months produced no particular increase in the BHC or DDT content in human plasma or rabbit plasma, or mouse liver, kidney, lung, or brain. The extent of BHC and DDT absorption in living organisms via the respiratory system is also difficult to determine due to the intake in food. However, it was concluded that by a careful usage of aerosol, the possibility of absorption of pesticides through the respiratory system could be minimized.

72-1297. Nobutomo, K.; Kodama, Y.; Kunitake, E.; Urabe, T.; Iwanishi, N. (School of Medicine, Kyushu University, Fukuoka, Japan). **[Toxicity of organophosphate (*O,O*-diethyl-*O*-(3-oxo-2-phenyl-2*H*-pyridazine-6-yl) phosphorothioate. I. The influence on enzyme activity.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.), 27(1): 110, 1972.* (Japanese)

The influence of *O,O*-diethyl-*O*-(3-oxo-2-phenyl-2*H*-pyridazine-6-yl) phosphorothioate (NC250) on cholinesterase, GOT, and GPT activities was examined. White house rabbits, W.K. rats and ddN mice were used for the experiments. NC250 was fed at various concentrations (1 ppm, 5 ppm, 10 ppm, 50 ppm, 100 ppm, 500 ppm in the diet) to test animals each day for three months, and blood samples were taken from the main artery of the ear each week. Red blood cells, leucocytes, hemoglobin, hematocrit, and plasma protein were measured. Cholinesterase activities in the whole blood and plasma were measured with a high-sensitivity pH meter, and GOT and GPT activities were measured by an autoanalyzer. The animals were killed immediately after the feeding period, and the cholinesterase activities of the whole brains and cerebella were examined. The daily feeding of NC250 at 10 ppm for three months did not show any effect on the enzyme activity of rabbits. A decrease in ChE was noted in the plasma of rats at dosages of more than 10 ppm and also in mouse groups at dosages of more than 3 ppm. No influence was noted in the brains of mice even with the administration of the maximum, 100 ppm. Enzyme activities had decreased in the brains of rats at the 500 ppm dosage. From these results, it was concluded that ND250 was an organophosphate of relatively low toxicity.

72-1298. Kunitake, E.; Kodama, Y.; Nobutomo, K.; Urabe, T.; Iwanishi, N. (Dept. of Hygiene, School of Medicine, Kyushu University, Fukuoka, Japan). **[Toxicity of an organophosphate (*O,O*-diethyl-*O*-(3-oxo-2-phenyl-2*H*-pyridazine-6-yl) phosphorothioate. II. Pathological observations.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 27(1): 111; 1972.* (Japanese)

The subchronic effects and pathological symptoms were observed after administering NC250 for three and six months. A predetermined amount of NC250 was dissolved in 10% starch solution and was injected into the stomachs of mice and rats, and the LD50 determined obtained by the Behrens method. The subchronic test was administered in the same way as in the previous report (see Abstract No. 72-1297), and the change in weight was observed in relation to the amount of NC250 intake. In the LD50 test, acute poisoning symptoms consisted of sluggishness, clonic seizures and death. Excessive lacrimation and salivation, and diarrhea were recognized. Autopsy revealed that the direct cause of death was suffocation due to paralysis of respiratory muscles or anesthetization of the respiratory center. Delayed deaths were not observed. The maximum administration of NC250 for the subchronic sympton test of rats and mice amounted to one half of the LD50 dosage, which was 500 ppm for rats and 100 ppm for mice. A gradual increase in weight was noted in the test animals, but there was no relationship between the dosage and the degree of weight change. Pathologically,

cloudy swelling of liver and kidney was recognized. There seems to be no dose-response relationship. It was concluded that NC250 has a relatively low toxicity among organophosphate pesticides. No deaths due to poisoning or impairment of growth was noted during the subchronic test. There were no pathological symptoms of dosages of less than 50 ppm for rats and 30 ppm for mice, and the maximum dosage for six months produced only slight reversible changes.

72-1299. Kawai, M.; Iwahara, S. (School of Hygiene, National Defense Force, Japan). **[Synergism in toxicity of pesticides.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 27(1): 112; 1972.* (Japanese)

Interactions and increases in toxicity caused by the simultaneous administration of more than one kind of pesticide, or pesticides and disinfectants, were examined. Eight kinds of pesticides and four kinds of disinfectants were used. The combinations were injected subcutaneously and the mortality within one week was observed. When administering two kinds of chemicals, groups with injection of each separate chemical were always used as control groups, and the anticipated mortality was calculated from individual LD25s. Mortality averages were obtained by replicate tests. Enhanced toxicity was recognized with combinations such as parathion and Sumithion (fenitrothion), DDVP and DDT, Sumithion and PCP, BHC and PCP, and DDT and PCP. Antagonistic reactions were recognized between parathion and malathion, EPN and DDT, malathion and DDT, and BHC and DDT. Other combinations resulted in normal additive effects. Synergistic reactions and antagonistic reactions were also recognized in certain combinations of pesticides and disinfectants.

72-1300. Tomii, S.; Nagasaki, H.; Mega, Y. (Department of Hygiene, School of Medicine, Nara University, Nara, Japan). **[Studies on BHC as a carcinogen.]** *Nippon Eiseigaku Zasshi (Jap. J. Hyg.) 27(1): 113, 1972.* (Japanese)

The chronic toxicity, especially the carcinogenic effects, of organochlorines were examined via long-term administration of BHC in mice. Three groups of male dd mice were used, and various dosages of mixtures containing 67% α-BHC, 11% of β-BHC, 15% γ-BHC (lindane), 6% of δ-BHC were incorporated into the standard diet. The fourth group was used as the control group. The total food intake and weight were measured every week. The test animals were killed in 24 weeks, then weighed, and pathological examinations were conducted on all organs. The weight curve was unremarkable up to four weeks in the maximum administration group, but showed an increase after that period. A high rate of weight increase was noted after 13 weeks. On the other hand, the food intake of this group clearly decreased after eight weeks. Autopsy revealed that nodule formation in various sizes up to 1 cm had occurred in 100% of the maximum dosage group. There was no nodulation in other groups. The residual accumulation of α-BHC in the maximum dosage group was 11.44 ppm and β-BHC 12.37 ppm, both extremely high.

72-1301. Natoff, I. L. (Shell Research Ltd., Tunstall Lab., Sittingbourne, Kent, England). **Influence of the route of exposure on the acute toxicity of cholinesterase inhibitors.** *Eur. J. Toxicol. 3: 363-367; 1970.* (8 references)

The acute toxicities of several anticholinesterase compounds, of pesticidal and drug utility, varied depending on the route of administration in female mice. Compounds which are rapidly degraded by the liver, such as neostigmine, eserine, mevinphos, crotoxyphos, paraoxon, and dichlorvos, are more toxic by peripheral (intravenous and subcutaneous) than by hepatic (intraperitoneal and peroral) routes. Compounds which are equitoxic by the two types of routes (such as monocrotophos, dicrotophos, and chlorfenvinphos) may only be degradable by enzymes which are not present at high activities in the mouse. Parathion is more toxic by the hepatic routes due to its conversion to the toxic metabolite, paraoxon, in the liver. Intracerebral injection bypasses the blood-brain barrier, so that all of the compounds were several orders of magnitude more toxic by this route, except parathion due to the absence of hepatic activation and chlorfenvinphos for unexplained reasons. The ranking of the compounds was approximately the same, regardless of the route of administration.

72-1302. Henneberg, M. (Laboratoire de Toxicologie, Institut des Plantes Medicinales, Poznan, Poland). **Methemoglobinemie, coproporphyrinurie et urobilinogenurie chez le rat au cours de l'intoxication experimentale par les herbicides derives du dinitrophenol: DNBP (Dinosebe) et NDPP (Dinoprope). [Methemoglobinemia, coproporphyrinuria and urobilinogenuria in rats experimentally poisoned with the dinitrophenol derivatives DNBP (dinoseb) and DNPP (dinoprop).]** *Eur. J. Toxicol. 4: 9-18; 1971.* (74 references) (French)

Methemoglobin formation, coproporphyrin and urobilinogen excretion, and liver function in male Wistar rats treated with DNBP (dinoseb, isobutyl-2-dinitro-4,6-phenol) and DNPP (dinoprop, isopropyl-2-dinitro-4,6-phenol) were studied. For acute and subacute poisoning, doses of 60 mg/kg and both 20 and 25 mg/kg, respectively, were administered daily, while chronic poisoning was produced by 10 mg/kg-doses administered every 32 days by esophageal tube. The methemoglobin total hemoglobin ratio was 6.77% for DNPP and 3.85% for DNBP. The methemoglobin value was higher after one month of chronic poisoning than during acute poisoning (9.33% versus 5.83% for DNPP, and 8.87% versus 2.85% for DNBP). Increased coproporphyrin excretion was revealed. In chronic poisoning, maxima of

3.62 μg/day (for DNBP) and 3.30 μg/day (for DNPP) were found on 28th and 32nd day, respectively. The respective values for 20 mg/kg-doses were four to five times above normal. Increased urobilinogen excretion was found for both DNBP: 0.040 μg/day and 0.038 μg/day on the fourth day, and 0.076 and 0.018 μg/day on the 29th day. Increases in both hemoglobin and erythrocyte count were observed. In liver, considerable dilatation of the sinusoids with coagulated plasma accumulations and stimulation of reticuloendothelium were detected. The jaundice caused by both DNPP and DNBP in chronic poisoning was of hematogenic rather than hepatotoxic origin.

72-1303. Palmer, J. S. (Toxicological Research Lab., Veterinary Sciences Research Div., ARS, U.S. Dept. of Agriculture, Kerrville, TX 78028). **Toxicity of famfur to young Brahman heifers and bulls.** *J. Amer. Vet. Med. Ass. 159(10): 1263-1265; 1971.* (7 references)

Three Brahman bulls, three Brahman heifers and four Hereford heifers were treated by pour-on application with a 13.2% liquid famfur (famphur) contentrate at 40.5 mg famfur/kg body weight, which is the dose recommended as a systemic insecticide for control of cattle grubs. Within 24 hr after treatment, one Brahman bull exhibited dyspnea, followed by increasing respiratory distress, excessive salivation, and torticollis. Despite four injections of atropine, the bull was found dead on the third morning after treatment. A second Brahman bull displayed anorexia and hypersalivation on the second and third days after treatment, while no symptoms appeared in the third (a bull which showed some signs of crossbreeding) or in the Brahman or Hereford heifers. Cholinesterase activity fell to between 20 and 30% of normal in the Brahman cattle; a slight rise was noted in the heifers 9 days after treatment. Cholinesterase activity in the Herefords was only reduced to 50 to 60% of normal, and appreciable restoration began on the 8th day. Thus, famfur should be added to the list of insecticides, also including Compound 4072 (chlorfenvinphos), crotoxyphos, and dioxathion, to which young Brahman bulls displayed increased sensitivity.

72-1304. Short, C. E.; Cuneio, J.; Cupp, D. (Dept. of Veterinary Medicine and Surgery, U. of Missouri, Columbia, MO 65201). **Organophosphate-induced complications during anesthetic management in the horse.** *J. Amer. Vet. Med. Ass. 159(11): 1319-1327; 1971.* (9 references)

Experiments were carried out to study cardiovascular responses and the relationship of the responses in individual animals with administration of succinylcholine, particularly after administration of organophosphates. All ponies given succinylcholine, at a dose necessary to give complete muscle relaxation, followed by a dose of organophosphate as an anthelmintic and 24 hrs later a second dose of succinylcholine, had complete apnea for at least 4 min accompanied by cardiac arrhythmias. The two ponies mechanically ventilated survived. The response in all blood parameters measured was more marked after organophosphate treatment than after succinylcholine alone. Studies of four types of anthelmintic preparations revealed that combinations of phenothiazines and organophosphates caused the most severe complications after administration of succinylcholine. The medications tested were trichlorfon, phenothiazine, and piperazine; piperazine, carbon disulfide with phenothiazine; dichlorvos; and thiabendazole. Complete recovery of cholinesterase activity in ponies after administration of organophosphates took up to 30 days. The study indicates that the risk of succinylcholine administration is greatly increased and the dosage required is also increased in ponies following exposure to organophosphates.

72-1305. Engelhardt, G.; Walnoefer, P. R.; Plapp, R. (Bayerische Landesanstalt fuer Bodenkultur, Pflanzenbau und Pflanzenschutz, und Institut fuer Botanik der Technischen Universitaet, Munich, Germany). **Identification of *N,O*-dimethylhydroxylamine as a microbial degradation product of the herbicide, linuron.** *Appl. Microbiol. 23(3): 664-666; 1972.* (5 references)

The formerly unidentified product in the degradation of linuron [3-(3,4-dichlorophenyl)-1-methoxy-1-methylurea] has been identified as *N,O*-dimethylhydroxylamine on the basis of comparison of dinitrophenyl derivatives of the two compounds by GLC, TLC, and spectrophotometry. A mechanism for its degradation in the presence of a cell-free extract from *B. sphaericus* is proposed which involves hydrolysis of the molecule, yielding 3,4-dichloroaniline and an intermediate which loses carbon dioxide to form *N,O*-dimethylhydroxylamine.

72-1306. Gardiner, E. E.; Hironaka, R.; Slen, S. B. (Research Station, Canada Dept. of Agriculture, Lethbridge, Alberta, Canada). **Growth, feed efficiency and levels of mercury in tissues of two breeds of chickens fed methyl mercury dicyandiamide.** *Can. J. Anim. Sci. 51: 657-662; 1971.* (10 references)

Mercury (as the seed fungicide methyl mercury dicyandiamide) was administered in the feed at 0, 0.33, 0.66, 1.32, 2.64, 5.29, 10.58, and 21.16 ppm Hg to males of two chicken breeds, single-comb white leghorns and broiler-type. At the end of the 8-wk administration (beginning on the day of hatching), mercury contents were determined in tissue samples taken from heart, kidney, breast and liver. The growth rate of the broiler-type chickens was depressed at the three highest dietary mercury levels, whereas that of the leghorns was only depressed at the highest level. Dietary mercury did not significantly affect feed efficiency; increased mortality was not noted except in the group receiving the highest mercury levels. After 8 wk, the broiler in the highest

dosage group had consumed 87.62 mg of mercury each and the leghorns, 50.82 mg (higher total feed consumption but lower consumption per unit body weight in broilers). Kidney levels at this time averaged 39 ppm in broilers, 35 ppm in leghorns; liver, 35 ppm for both breeds; heart, 8.1 ppm for both breeds; and breast meat, 16 ppm for broilers and 15 ppm for leghorns. The Rhodamine B dye used to label mercury-treated grain was not taken up into tissues of the chickens.

72-1307. Dikshith, T. S. S.; Datta, K. K. (Industrial Toxicology Research Centre, Chattar Manzil Palace, Lucknow, India). **Effect of parathion on the skin of guinea-pigs.** *Experientia 28(2): 169-171; 1972.* (11 references)

Lateroabdominal application of 1 ml of a 1 ppm solution of parathion for 5, 10, or 15 days produced no clinical symptoms of poisoning or death in female guinea pigs. Although no macroscopic changes such as dermatitis were observed, microscopic examination of the skin indicated hyperkeratinization of the epidermal layer and thickening of the stratum corneum after five days, scattered infiltration of mononuclear cells after ten days and localization of these cells around hair follicles and sebaceous glands after 15 days. The same pathology may not be observed in man, since the skin of guinea pigs differs from that of man in having a mosaic pattern of hair growth. However, the experiment does indicate possible types of skin damage and is interesting because of its possible relationship to delayed poisoning due to skin absorption of insecticides in tropical conditions.

72-1308. Saschenbrecker, P. W.; Funnell, H. S.; Platonow, N. S. (Canada Dept. of Agriculture, Animal Pathology Lab., Guelph, Ontario, Canada). **Persistence of polychlorinated biphenyls in the milk of exposed cows.** *Vet. Rec. 90(4): 100-102; 1972.* (13 references)

In view of the reported deleterious effects of polychlorinated biphenyls (PCBs) in man and animals, the excretion of PCBs by lactating cows was followed, after peroral administration of a single dose of PCBs. One cow was given 10 mg and another, 100 mg per kg body weight. Ten days after administration, the milk of the cow given the smaller dose contained 6 ppm of PCBs and the feces, 0.7 ppm; the milk of the cow given the higher dose contained 74 ppm and the feces, 7.5 ppm. The urine contained less than 0.01 ppm in both cases. The milk levels dropped by half within three days after administration, then continued to decrease gradually. Detectable levels continued to be excreted for up to 50 days. The total recovery of PCBs within 5 days amounted to 9% in the cow given 10 mg/kg and 6% in the cow given 100 mg/kg; in each case, about three-fourths was excreted in the milk and the remainder in the feces. Gas chromatographic tracings of the PCB component recovered from bovine liver coincided with those of the Arochlor 1254 standard.

72-1309. Nezefi, T. A. (Ashkhabad Epidemiologic and Hygienic Institute, Ashkhabad, USSR). **Morfologicheskiye izmeneniya v organizme belykh krys pri dlitel' nom vozdeystvii atrazina. [Morphological alterations in the organs of white rats during chronic treatment with atrazine.]** *Zdravookhr. Turkm. 15(3): 9-12; 1971.* (Russian)

Experiments were carried out on white rats subjected to chronic treatment with atrazine over six months. Doses of 0.1 mg/kg caused minor alterations only, such as an increase in the permeability of blood vessels and in the leukocyte count from 13,000 to 15,000/mm^3, as well as a decrease in hemoglobin from 15 g% to 11.4 g%. Slightly swollen Kupffer cells in liver were found, and one case of slight perivascular infiltration in the kidney was observed. Pericapillary and capillary edemas in the brain, and swelling or corrugation of Purkinje cells in the cerebellum were detected. The development of gametes in the ovary was disturbed or inhibited. Chronic doses of 20 mg/kg caused severe morphological alterations in the central nervous system, parenchymal, endocrine, secretory and sexual organs as well as alterations of physiological and biochemical functions. Death occurred in 40%, with symptoms such as respiratory distress and paralysis of limbs. Bloody secretions from eyes and nose and furunculosis were observed. Decreased blood vessel permeability, hemoglobin and liver antitoxic function were revealed. Swollen Kupffer cells and granular protoplasm in liver were found. Brown granules and erythrocytes tending to agglutination were found in the kidney. Bronchitis and peribronchitis were noted. Hyperplasia and hyperemia were revealed in the spleen. Pericapillary and capillary edemas with many pyknotic neurons and disorganization or regression of cortical cells in brain, and edemas and dystrophy of Purkinje cells in the cerebellum were observed. Reduced function and small dark yellow granules in the thyroid gland were detected. The dark yellow granules detected in several organs and even in capillaries, cells, and kidney parenchyma, may have been pesticide residues.

72-1310. Binns, W.; Johnson, A. E. (ARS, VSR Div., Poisonous Plant Research Lab., Logan, UT). **Chronic and teratogenic effects of 2,4-D (2,4-dichlorophenoxyacetic acid) and atrazine (2-chloro-4-ethylamino-6-isopropylamino-*s*-triazine) to sheep.** *Proc. N. Cent. Weed Contr. Conf. 25: 100; 1970.*

No sign of congenital malformations in the lambs, or clinical poisoning or histopathological lesions in the dams were noted when pregnant ewes were given 2 g of 2,4-D, mixed with alfalfa meal, by stomach tube for 30, 60, and 90 days after breeding. When atrazine was given to two groups of six ewes each at 15 or 30 mg/kg/day, mixed with alfalfa meal via stomach tube, maternal mortality occurred in the higher dosage group. All of the ewes given 30 mg/kg died between days 36 and 60 of gestation. One of these ewes had failed to conceive, three had experienced embryo deaths, and two were

carrying normal fetuses. In the lower dosage group (15 mg/kg/day), all animals delivered normal, live lambs at term. These lambs nursed their mothers for 30 days postpartum, while the ewes were still receiving the atrazine doses, without any indications of poisoning. The lower dosage level corresponds to the highest quantity which could be expected to occur on plants treated with atrazine.

72-1311. Wrenn, T. R.; Weyant, J. R.; Fries, G. F.; Bitman, J. (Animal Science Research Div., ARS, U.S. Dept. of Agriculture, Beltsville, MD 20705). **Influence of dietary *o,p'*-DDT on reproduction and lactation of ewes.** *J. Anim. Sci. 33(6): 1288-1292; 1971.* (21 references)

Following the administration of a diet containing 10 ppm of *o,p'*-DDT (an amount which might be expected to occur in inadvertently contaminated feed) to ewes for two to nine months, no significant variations were found in estrogen-sensitive parameters such as uterine/ovarian/body weight ratio or water, glycogen and glucose content of uterus and liver. Body fat levels of *o,p'*-DDD (TDE) were constant at 0.16 ppm from the second to the ninth month of treatment; body fat levels of *o,p'*-DDT gradually increased from 0.29 to 0.39 ppm during this time. The *p,p'*-DDT content of the body fat, which increased 0.14 ppm (similar to control value) to 0.48 ppm between the second and ninth months, was thought to have been raised by contamination of the experimental *o,p'*-DDT with the *p,p'*-isomer. No *o,p'*-DDE was detected. The lambs of ewes on this regimen, which could have received *o,p'*-DDT prenatally, via the milk or via the experimental feed, displayed tissue concentrations of DDT compounds similar to those of the dams, except that the *o,p'*-DDD contents were twice as high, indicating that the lambs' ability to metabolize this substance was limited. The milk of ewes fed *o,p'*-DDT for eight months contained 0.33 ppm of *o,p'*-DDT and 0.28 ppm of *p,p'*-DDT.

See also **72-1130** **72-1146** **72-1207** **72-1209** **72-1225**

72-1312. Bazzi, R.; Fabbrini, R.; Radice, M. (Direzione Generale Ricerche e Brevetti, Istituto Richerche Agrarie Montedison S.p.A., Milan, Italy). **Thin layer chromatographic-gravimetric determination of *O,O*-diethyl *S*-(*N*-isopropylcarbamoylmethyl) phosphorothiolothionate (Prothoate) in technical products and liquid formulations.** *J. Ass. Offic. Anal. Chem. 54(6): 1313-1315; 1971.* (8 references)

A method, based on phosphorus determination after thin layer chromatographic separation, has been developed for the analysis of *O,O*-diethyl *S*-(*N*-isopropylcarbamoylmethyl) phosphorothiolothionate in both technical products and liquid formulations. The insecticide or a convenient amount of an insecticidal preparation is dissolved in benzene and the solution is spotted on a thin layer chromatographic plate. After the plate is developed and sprayed with the chromogenic reagent, the portion containing prothoate is scraped off and the pesticide is eluted with methanol. The quantity of the active ingredient in the eluate is obtained by estimation of phosphorus as quinoline phosphomolybdate and the concentration of prothoate in the original sample can be calculated. (Author abstract by permission.)

72-1313. Williams, D. T.; Blanchfield, B. J. (Food Division, Food and Drug Directorate, Dept. National Health and Welfare, Ottawa, Ontaria, Canada K1A OL2). **Screening method for the detection of chlorodibenzo-*p*-dioxins in the presence of chlorobiphenyls, chloronaphthalenes, and chlorodibenzofurans.** *J. Ass. Offic. Anal. Chem. 55(1): 93-95; 1972.* (12 references)

A method has been devised for the detection of chlorodibenzo-*p*-dioxins in the presence of chlorobiphenyls, chloronaphthalenes, and chlorodibenzofurans. The chlorodibenzo-*p*-dioxins are chlorinated to octachlorodibenzo-*p*-dioxin, which is then identified by electron capture gas-liquid chromatography. 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin has been determined in corn oil at the 1 ppm level. (Author abstract by permission.)

72-1314. Caswell, R. L. (Pesticides Regulation Div., Environmental Protection Agency, Washington, DC 20250). **Report on pesticide formulations.** *J. Ass. Offic. Anal. Chem. 55(2): 244-245; 1972.*

A report of the General Referee for Pesticide Formulations, presented at the 85th Annual Meeting of the AOAC, Washington, D.C., Oct. 11-14, 1971, announces the development and study of several new methods of analysis for pesticide formulations, and the completion of a few studies. Associate Referees reported methodological improvements, collaborative study results and continued investigations on the analysis of formulations containing various organophosphate, organochlorine, and carbamate insecticides; carbamate and pyridinium herbicides; nitro compounds; mercurials; and fertilizer-pesticide mixtures. Adoption of methods of analysis for atrazine, diazinon, dicamba, dacthal, diquat, paraquat and prometryne was recommended as the official final action. A thin-layer chromatographic method for determining contaminants in pesticide formulations was recommended for adoption as the official first action. Collaborative studies and appointment of new Associate Referees on various topics were also included in the recommendations.

72-1315. Storherr, R. W. (Pesticides Tolerances Div., Environmental Protection Agency, Washington, DC 20460). **Report on carbamate pesticides and on fumigants and miscellaneous pesticides.** *J. Ass. Offic. Anal. Chem. 55(2): 283; 1972.* (4 references)

The Report of the General Referee for Carbamate Pesticides, Fumigants and Miscellaneous Pesticides was presented at the 85th Annual Meeting of the AOAC, Washington, D.C., Oct. 11-14, 1971. The Associate Referee for Fumigants and Miscellaneous Pesticides reported the initiation of a collaborative study for cyanides. The General Referee has been engaged in the development of a multiple carbamate pesticide cleanup and detection method, preferably applicable to the intact pesticides. A column containing 5 or 6% DC-200 on 80 to 100 mesh Chromosorb W (HP) and a column temperature of 170 to 180°C were the optimum conditions for carbamate chromatography, and the electrolytic conductivity detector in the reductive mode is the best specific determination method. Sensitivities with this detector range from 8 ng Eptam to 50 ng carbaryl. Loss of carbamates occurs in the concentration steps; use of a rotary evaporator is preferable to use of a Kuderna-Danish concentrator. Crops are extracted with acetonitrile and the extracts cleaned up on a short column containing charcoal, Sea Sorb and Celite. Zectran and Eptam recoveries are low without addition of a "keeper". Continuation of these studies is recommended.

72-1316. Burke, J. A. (Div. of Chemical Toxicology, Food and Drug Admin., Washington, DC 20204). **Report on chlorinated pesticides.** *J. Ass. Offic. Anal. Chem. 55(2): 284-287; 1972.* (8 references)

This report summarizes the past year's efforts by the General Referee and seven Associate Referees for Chlorinated Pesticides, as presented at the 85th Annual Meeting of the AOAC, Washington, D.C., Oct. 11-14, 1971. AOAC methodology for organochlorine pesticide analysis follows a multiresidue approach; various Associate Referees reported on successes or difficulties in analyses for groups of compounds or different sample types within this multiresidue framework. For example, the acaricides chlorobenzilate, chloropropylate and acarol are not completely recovered through the Florisil column chromatographic cleanup of the AOAC multiresidue methodology. Thus additional efforts in the

development of the multiresidue method are required. Interest in the area of polychlorinated biphenyls currently centers on detection, identification and measurement of residues. The large number of variables possible in the case of these compounds demands the exercise of good judgment by analytical chemists to avoid the generation of misleading residue data. Adoption of the revised general method for pesticide residues as official final action for certain organochlorine pesticide residues in several food products is recommended.

72-1317. Yip, G. (Div. of Chemical Technology, Food and Drug Administration, Washington, DC 20204). **Report on fungicides, herbicides, and plant growth regulators.** *J. Ass. Offic. Anal. Chem. 55(2): 287-289; 1972.* (16 references)

The work reported under this heading at the 85th Annual Meeting of the AOAC, Washington, D.C. Oct. 11-14, 1971, was essentially that of the General Referee's laboratory, since little progress was made by the Associate Referees on the topics in this category. The development of six new herbicides was reported. Methods were developed for the analysis of parinol in formulations and residues, and of vitavax and its sulfoxide in cereal grains; both of these compounds are fungicides. Analytical procedures or a number of herbicides were developed or improved; these include the arsenicals group, chlormequat chloride, 2,4-D, DNBP, maloran, picloram, terbacil and hydroxylated triazines. Work is in progress on analytical techniques for dithiocarbamate fungicides, chlorophenoxy acids and carbamates. The appointment of additional Associate Referees within this study area is recommended.

72-1318. Mallet, V.; Frei, R. W. (Dept. of Chemistry, Dalhousie U., Halifax, Nova Scotia, Canada). **An investigation of flavones as fluorigenic spray reagents for organic compounds on a cellulose matrix. Part III. Quantitation of the method.** *J. Chromatogr. 60(2): 213-217; 1971.* (6 references)

A method for the detection and quantitative determination of organic compounds by *in situ* fluorimetry after separation on cellulose layers is discussed. The organothiophosphorus pesticide Proban (cythioate) was used as test sample for quantitative studies. Best results were obtained when the 3-hydroxyflavone robinetin was used as spray reagent. The stability of the fluorescence towards ultraviolet light was investigated. Linear calibration curves between 10 and 0.1 μg were obtained. The method was applied to the determination of Proban in tap water. (Author abstract by permission.)

72-1319. Aue, W. A.; Moseman, R. F. (U. of Missouri, Columbia, MO 65201). **The spectral response of the alkali flame detector.** *J. Chromatogr. 61(1): 35-43; 1971.* (16 references)

A typical, pellet-type alkali flame detector was monitored photometrically. Its predominant (but not exclusive) mode of response is negative, *i.e.* alkali emission decreases when gas chromatographic effluents are burned in the flame. As a detector for organic halides, the optical emission of the alkali flame appears to stimulate some characteristics of its more often used electrical conductivity response. For instance, it is possible to distinguish between chlorine, bromine and iodine, and the (negative) response for chlorides is proportional to the amount of chlorine entering the flame. Calibration curves for selected chlorinated hydrocarbons approach linearity on a logarithmic scale within two orders of magnitude, with minimum detectable amounts between 3 to 5 ng. Carbon compounds give signals approximately fifty times weaker than monochlorinated compounds. All characteristics considered, the pellet-type alkali source seems to differ considerably in its spectral behavior from other types of sources which have been described in the literature, especially those using a resistance heated wire coated with sodium sulfate. (Author abstract by permission.)

72-1320. Frei, R. W.; Lawrence, J. F. (Dalhousie U., Halifax, Nova Scotia, Canada). **Fluorigenic labelling of carbamates with dansyl chloride. I. Study of reaction conditions.** *J. Chromatogr. 61(1): 174-179; 1971.* (7 references)

In a continuing study on TLC-fluorometric analysis of pesticide residues, the optimal reaction conditions for fluorigenic labeling of carbamates with dansyl chloride (1-dimethylaminonaphthalene-5-sulfonyl chloride) were sought. Optimal coupling of the labeling reagent to pesticides was attained by reaction at 45° for 30 min; in the case of slowly-hydrolyzing carbamates such as Bux, Baygon and Matacil, preliminary hydrolysis of the carbamate with 0.1 *M* sodium bicarbonate for 10 to 30 min is required. This bicarbonate concentration gives a buffer pH of 9, which was found to provide the optimal balance between carbamate and dansyl chloride hydrolysis rates. More rapidly hydrolyzing carbamates such as carbaryl and mesurol may be reacted directly. At least a four-fold molar excess of dansyl chloride reagent is required, but a greater excess does not affect the results. Under optimum conditions, spots containing less than 1 ng of pesticide can be analyzed spectrophotofluorometrically.

72-1321. Aue, W. A.; Teli, P. M. (U. of Missouri, Columbia, MO 65201). **Sampling of air pollutants with support-bonded chromatographic phases.** *J. Chromatogr. 62(1): 15-27; 1971.* (21 references)

A system employing support-bonded silicones on Chromosorb was developed for trapping organic vapors from air. The vapors, including pesticide vapors, can then be extracted with various solvents (the support-bonded liquid silicones are retained in the sampling car-

tridges during solvent extraction), and analyzed by numerous methods including gas chromatography with a variety of detectors, mass spectrometry, and combined techniques. Lindane, heptachlor, heptachlor epoxide, aldrin and dieldrin were quantitatively collected from a doped air stream in the first cartridge of a system of two silicone/Chromosorb-Diatom cartridges, and the extracts analyzed by gas chromatography with an electron capture detector.

72-1322. Still, G. G.; Mansager, E. R. (Plant Science Research Div., ARS, U.S. Dept. of Agriculture, Metabolism and Radiation Research Lab., Fargo, ND 58102). **The pyrolysis of isopropyl-5-chloro-2-hydroxycarbanilate during gas chromatography.** *J. Chromatogr. 62(1): 29-37; 1971.* (13 references)

Isopropyl 5-chloro-2-hydroxycarbanilate (a major metabolite of chloropropham in soybeans) has been shown to thermally degrade to 5-chloro-2-benzoxazolinone and unidentified polymeric products. Isopropyl 2-acetoxy-5-chlorocarbanilate was thermally degraded to *N*-acetyl 5-chloro-2-benzoxazolinone and polymeric products. When isopropyl 2-acetoxy-5-chlorocarbanilate was pyrolyzed in the presence of dimethylamine isopropyl 2-hydroxy-5-chlorocarbanilate, 5-chloro-2-benzoxazolinone and 3-(2-hydroxy-5-chlorophenyl)-1,1-dimethylurea were isolated. The acetylated carbamate was shown to be thermally more stable than the hydroxy analog. (Author abstract by permission.)

72-1323. Albro, P. W.; Fishbein, L.; Fawkes, J. (National Inst. of Environmental Health Sciences, Research Triangle Park, NC 27709). **Purification and characterization of pesticidal synergists. I. Piperonyl butoxide.** *J. Chromatogr. 65(3): 521-532; 1972.* (30 references)

Piperonyl butoxide in greater than 99% purity could be obtained from technical material after a single chromatographic separation on Florisil. Among the identifiable impurities in technical grade material were diethyleneglycol monobutyl ether, dihydrosafrole, 6-methyl dihydrosafrole, 6-propyl piperonyl methoxide, 6-propyl piperonal, 6-chloromethyl dihydrosafrole, 6-propyl piperonylic alcohol, 2-propyl-4,5-dimethoxybenzyl *n*-butyldiethyleneglycol ether, bis(2-propyl-4,5-methylenedioxyphenyl) methane and di(2-propyl-4,5-methylenedioxybenzyl) ether. (Author abstract by permission.)

72-1324. Ebing, W. (Biologische Bundesanstalt fuer Land- und Forstwirtschaft, Institut fuer Pflanzenschutzmittelforschung, D1000 Berlin 33, Germany). **Routinemethode zur duennschichtchromatographischen Identifizierung der Pestizidrueckstaende aus den Klassen der Triazine, Carbamate, Harnstoffe und Uracile. [Routine method for identification of pesticide residues of triazine, carbamate, urea and uracil type compounds by thin-layer chromatography.]** *J. Chromatogr. 65(3): 533-545; 1972.* (25 references) (German)

For a reliable and reproducible identification by thin-layer chromatography, ten systems for the separation and detection of 61 pesticides, mostly herbicidal, have been developed, based on a general technique described previously. Two or three systems for each group of pesticides enable the analyst to differentiate almost all of the 61 compounds unambiguously, with only three pairs of substances remaining unresolved. These results can be obtained by statistical evaluation of the variabilities in the *Rf* values of these systems. (Author abstract by permission.)

72-1325. Lawrence, J. F.; Frei, R. W. (Dept. of Chemistry, Dalhousie, U., Halifax, Nova Scotia, Canada). **Fluorigenic labelling of carbamates using dansyl chloride. II. Fluorescence phenomena of the derivatives.** *J. Chromatogr. 66(2): 93-99; 1972.* (5 references)

The experimental parameters affecting the fluorescence of *N*-methyl carbamates as their dansyl (1-dimethylaminoaphthalene-5-sulfonyl) derivatives were investigated. Exposure to ultraviolet light causes a degradation of the dansyl derivatives, resulting in slight shifts in fluorescence excitation and emission maxima as well as in a decrease in fluorescence intensity. Spraying the derivatives with triethanolamine in isopropanol improved the *in situ* quantitative analysis of the carbamate. Further increase in fluorescence is observed with sprays consisting of aqueous buffers, but the derivatives are less stable with time. Stabilization is possible, however, by covering the moist chromatoplate with a thin glass sheet. Only 2 to 3% loss in sensitivity is observed under these conditions. Long-range storage, however, is not possible with the aqueous buffers. At a pH of less than one, the fluorescence of the derivatives is quenched reversibly. (Author abstract by permission.)

72-1326. Lawrence, J. F.; Legay, D. S.; Frei, R. W. (Dept. of Chemistry, Dalhousie U., Halifax, Nova Scotia, Canada). **Fluorigenic labelling of carbamates using dansyl chloride III. Thin-layer chromatographic properties of the derivatives.** *J. Chromatogr. 66(2): 295-301; 1972.* (4 references)

The chromatographic separation of the dansyl derivatives of several carbamate insecticides has been investigated. Three solvent systems were utilized for the development of the derivatives on Silica Gel G layers. Silver oxide was incorporated into the adsorbent for the separation of the Mesurol phenol derivative from that of Landrin. The silver oxide plates caused a decrease in the fluorescence of the derivatives with time when compared with silver-free plates. Ultraviolet light was found to have a hydrolytic effect on the derivatives and a number of fluorescent products were obtained. Light at 254 nm wavelength caused a greater degradation of the adsorbed compounds than at 350 nm. The solvent

systems are relatively non-polar and fast-running. One-dimensional chromatography over a distance of 13 cm can be accomplished in 30 to 40 min. All chromatography must be carried out in the dark to avoid decomposition of the spots. (Author abstract by permission.)

72-1327. Hellwig, A.; Liebmann, R.; Hempel, D. (Hygiene-Institut Magdeburg, Magdeburg, German Democratic Republic). **Zur Rueckstandsbestimmung metallhaltiger Fungizide mit Hilfe einer Enzymtestmethode. [Determining the residues of metal-containing fungicides by means of an enzyme test method.]** *Arch. Pflanzenschutz 7(1): 73-78; 1971.* (3 references) (German)

Sandi's method for the determination of mercury, using a urease-agar technique, was adapted to other metals (zinc, iron, copper) present in fungicides. After the hardening of the agar previously treated with urease and bromthymol blue, holes of 4 to 5 mm diameter are punched in the agar. After the diffusion of the substance to be tested, the agar is sprayed with urea solution. The blue coloration caused by ammonia fails to occur around the holes due to the inhibiting effect of the metals, and thus the diameter of the unaffected rings is proportional to the metal concentration. This method was successfully applied to residues of ferbam, ziram, maneb, and partially successful on Cupral (copper oxychloride). Semi-quantitive determination of Brestan (fentin acetate) and zineb was possible. Benzene and chloroform were found to be the best solvents. Cleaning of the samples was not needed, and specific plant extraction techniques improved the sensitivity of the method (0.1 to 0.3 ppm, with reproducibility of 93%). Experiments with DDT, lindane, propham, chlorpropham, proxipham, toxaphene and PCNB were not successful.

72-1328. Reifenstein, H.; Heinisch, E. (Biologische Zentralanstalt Berlin der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin, Berlin, Germany). **Bestimmung von Chloratrueckstaenden im Boden. [Determination of chlorate residues in the soil.]** *Arch. Pflanzenschutz 7(1): 79-85; 1971.* (10 references) (German)

A colorimetric method developed for the determination of chlorate residues in the soil is described, and practical chlorate determinations are discussed. The method is based on a reaction of the chlorate with concentrated hydrochloric acid in the presence of potassium iodide. After the iodine is extracted by means of carbon tetrachloride the absorption peak of the violet solution is found at 533 nm. High soil:water ratios are required for the extraction from the soil samples. Following the centrifugation of the suspension, clear solution was obtained by means of Al ion addition. Soluble iron compounds were separated by means of precipitated calcium carbonate and ammonia solution. Practical determinations in depths of 0 to 30 cm in fields treated with chlorate herbicides revealed that the dynamics of chlorate residues were essentially influenced by both amount of precipitation and type of soil. Due to intense washout, after-seeds are not damaged by residues in light to medium soil, while heavy soils may contribute to retention of residues and subsequent seed damage.

72-1329. Conder, D. W.; Oloffs, P. C.; Szeto, Y. S. (Pestology Centre, Dept. of Biological Sciences, Simon Frazer U., Burnaby 2, B. C., Canada). **GLC separation of heptachlor epoxide, oxychlordane, α- and γ-chlordane.** *Bull. Environ. Contam. Toxicol. 7(1): 33-35; 1972.* (1 reference)

A rapid GLC method of screening for organochlorine residues and for confirming heptachlor epoxide and oxychlordane is described. Chromosorb W "HP", 80 to 100 mesh was treated with amounts of OV-17 and OV-210, dissolved in analytical grade ethyl acetate, which was necessary to give 1.5% and 1.95% final concentrations, respectively. The dried material was packed in a 6 ft X 1/4 in. silanized glass column and conditioned for 24 hr at 250°C. The Micro Tek MT 220 with ^{63}Ni electron-capture detector was operated with temperatures of 195° for the column, and 295° for the detector. The column separated compounds not generally separated satisfactorily (α-chlordane, γ-chlordane, oxychlordane and heptachlor epoxide) and provides sufficient sensitivity.

72-1330. Lester, J. F.; Smiley, J. W. (Northeast Louisiana U., Monroe, LA). **Rapid method for identifying aldrin in the presence of sulfur by electron capture gas chromatography.** *Bull. Environ. Contam. Toxicol. 7(1): 43-44; 1972.* (5 references)

A new GLC method for determining aldrin in the presence of elemental sulfur in hexane extracts of bottom sediments requires no prior conversion of aldrin or removal of sulfur. A Hewlett Packard Model 402 High Efficiency Gas Chromatograph equipped with a ^{63}Ni electron-capture detector was used. The column of Chromosorb W AWDMCS HP was coated with 3% OV-17, a polar liquid phase. Column temperature was 180°C. Standards (0.01 μg) of sulfur and aldrin which had the same retention time using the non-polar SE-30 on the column, were resolved using the OV-17.

72-1331. McKinney, J.; Fishbein, L.; Barling, L. (National Inst. of Environmental Health Sciences, Research Triangle Park, NC). **Selective complexation of impurities in the electron capture gas chromatographic determination of some chlorinated polycyclodiene pesticide metabolites and derivatives.** *Bull. Environ. Contam. Toxicol. 7(1): 2-8; 1972.* (11 references)

A method was developed for determining low levels of metabolites of chlorinated polycyclodiene pesti-

cides and possibly other oxygenated metabolites which utilizes the ability of europium nitrate as a selective complexing agent for undesirable oxygen and nitrogen containing impurities. Rat urine with added standards was acidified and extracted with ether. Residues from ether evaporation were treated directly with Tri-Sil Z and heated at 80° for 10 min. After cooling, benzene and europium nitrate were added, and the mixture was shaken 5 min and centrifuged. The supernatant was analyzed on a Varian Aerograph Model 1868-40 chromatograph equipped with a tritium foil electron-capture detector. Results with a series of compounds from metabolic studies on aldrin and dieldrin demonstrate the increased capability for detecting low levels of hydroxylated as well as other oxygenated metabolites.

72-1332. Dedde, M.; Dubosq, F.; Sauli, M.; Vertalier, S. (Laboratoires de Recherches de la Societe des Usines Chimiques Rhone-Poulenc, Vitry-sur-Seine, France). **Le malathion et son dosage par chromatographie en phase gazeuse. [Malathion and its determination by gas chromatography.]** *Chim. Anal. 53(10): 620-628; 1971.* (21 references) (French)

Malathion was determined by gas-liquid chromatography using a stainless-steel column containing 10% Silicone SE-30 as the stationary phase and using helium as the carrier gas. The temperature was programmed linearly from 130° to 260° in 20 min. Samples of malathion were dissolved in ethyl ether as were the internal standards; α-naphthylacetic acid, methyl ester and 2,4-D, butyleneglycol ester. Compared with traditional colorimetric techniques, this procedure does not appear to be susceptible to interference from contaminants. Included is a complete review of analytical procedures that have been used for the determination of malathion.

72-1333. Colas, A.; Lerenard, A.; Royer, J. (Inst. National de Recherche Chimique Appliquee, Centre de Recherche, 91-Vert-le-Petit, France). **Pollution des eaux. Extraction et dosage de certains herbicides phenoxyalcanoiques. [Water pollution. Extraction and determination of certain phenoxyalkanoic herbicides.]** *Chim. Anal. 54(1): 7-21; 1972.* (28 references) (French)

The phenoxyalkanoic herbicides 2,4-D, 2,4-DB, 2,4-DP (dichlorprop) and their derivatives were determined by gas-liquid chromatography. Solutions of 2,4-D in acidified methanol were methylated with diazomethane. The methylated derivatives were concentrated by lyophilization, and ester formation was verified by melting point determination and elemental analysis. In most cases, chromatography was performed on 5% Dow 701 silicone on Chromosorb W, using He as the carrier gas. The use of temperature programming, a variety of stationary phases as required, and a thermal conductivity detector allowed the separation of seven phenoxyalkanoic esters. Quantitation was achieved by the use of methyl phthalate (or sometimes methyl adipate or phenyl benzoate) as an internal standard. Preliminary attempts to separate the free acids by this method were unsuccessful. Using the extraction procedure described in the conclusion (see Abstract No. 72-1334), as little as 1 ppm of a phenoxyalkanoic herbicide in a 1-liter water sample can be determined.

72-1334. Colas, A.; Lerenard, A.; Royer, J. (Institut National de Recherche Chimique Appliquee. Centre de Recherche, 91-Vert-le-Petit, France). **Pollution des eaux. Extraction et dosage de certains herbicides phenoxyalcanoiques. Suite et fin. [Water pollution. Extraction and determination of certain phenoxyalkanoic herbicides. Continuation and conclusion.]** *Chim. Anal. 54(2): 62-68; 1972.* (28 references) (French)

After development of a gas chromatographic method for determination of phenoxy-alkanoic herbicides such as 2,4-D, 2,4-DB, 2,4-DP and their derivatives (see preceding abstract), it was necessary to perfect the procedure for herbicide extraction from water and removal of interfering compounds. Model solutions were prepared by adding 2 to 5 ml of a solution of one or more herbicides in acetone to 1 liter of distilled water, water from the river Juine (low pollution level), water from the river Orge (highly polluted), industrial waste water (previously treated with ferric and hypochlorite ions) and municipal waste water. Good recoveries (75 to 100%) were obtained upon extraction of all water types, except municipal waste water, at pH 2 with either chloroform or methylene chloride; yields from municipal waste water were generally above 60%. Some herbicide loss occurred at low concentrations (below 5 ppm) due to residual miscibility of water and solvents; therefore, extraction of a larger volume of water is advisable in such cases. Alkaline hydrolysis (followed by acidification to pH 2) prior to extraction will make all of the phenoxyalkanoic compounds available in free acid form. Under the conditions selected, only anionic surfactants can be expected to interfere appreciably in the analysis.

72-1335. Collombel, C.; Perrot, L. (Laboratoire de Toxicologie et d'Hygiene Industrielle, Faculte de Medecine at de Pharmacie, 69-Lyon, France). **Dosage de l'activite cholinesterasique du sang total preleve par ponction capillaire et depose sur papier filtre. Application a la detection des intoxications par les insecticides organo phosphores. [Determination of cholinesterase activity in whole blood, obtained by capillary puncture and placed on filter paper. Application to the detection of organophosphate insecticide poisoning.]** *Eur. J. Toxicol. 3(6): 368-372; 1970.* (13 references) (French)

A new technique has been developed for the collection and preservation of microsamples of blood for cholinesterase analysis. A drop of blood, obtained by capillary puncture, is placed on a special filter paper card imprinted with circles 11 mm in diameter. When these

circles are uniformly filled, they should contain about 30 μl of blood each (triplicate samples recommended). After drying, the enzyme activity of the blood spots is retained for at least 15 days at 4 to 25°C. For analysis, one blood spot is punched out and eluted by agitation in 1 ml of buffer solution for 30 min. The cholinesterase activity is then determined by the conventional colorimetric method with hydroxylamine. In this manner, samples can be taken from insecticide spray workers located far from the analytical laboratory, and simply mailed to the laboratory without any special packaging precautions.

72-1336. Soerensen, O.; Althaus, H. (Hygiene Institut des Ruhrgebiets, Gelsenkirchen, Germany). **Erweiterte spezifische Verfahren zum gaschromatischen Nachweis von Pestiziden. [Extended specific method for the gas chromatographic detection of pesticides.]** *Schriftenr. Ver. Wasser-, Boden- Lufthyg. Berlin-Dahlem 34: 125-130; 1971.* (23 references) (German)

Aside from the problems encountered in quantitative measurement of pesticide residues, the identification of a substance detected by gas chromatography is not always a straightforward matter. Various heteroelement detectors have evolved and provide important specific identity criteria. Much progress has already been made in the detection of phosphorus, nitrogen and sulfur; the Beilstein flame test has yielded halogen values which are specific and linear over three orders of magnitude. Beilstein flame ionization is measured using a tandem flame ionization detector. The lower flame is used only for combustion and recording of the CH-signal. The combustion products are carried by an air or oxygen stream into a second flame, which has the form of a broad plasma flame and is surrounded by a heatable platinum coil coated with an alkali salt if phosphorus detection is desired, or by a copper coil for halogen detection. This eliminated the interference of CH-, P-, S-, and N-containing compounds in the signal. Microdiaphragms maintain a constant flow of hydrogen through the coil and minimize noise. The reproducibility, linearity, response-recovery times, sensitivity, specificity, and versatility of this detector are good.

72-1337. Uporova, G. I.; Shtyler, S. Yu. (Regional Sanitary and Epidemiology Station, Smolensk, USSR). **Opredeleniye DDT i geksakhlorana v vozdukhe metodom tonkosloynoy khromatografii. [Determination of DDT and hexachlorane in the air by means of thin-layer chromatography.]** *Gig. Tr. Prof. Zabol. 15(11): 59-60; 1971.* (3 references) (Russian)

The air samples were aspirated through a silica gel-filled corrugated tube and a cotton containing adapter. Pesticide residues were then extracted with *n*-hexane or carbon tetrachloride, washed with sulfuric acid, distilled to a 0.1 ml volume and applied on TLC plates. The sorption layer was prepared with plaster and aluminum oxide (1:10) suspended in a 0.1% water solution of silver nitrate. Plates were dried at room temperature for 20 hr in a dark place. The plates were developed with *n*-hexane as a carrier solvent. Appearance of black spots under UV light with an *Rf* identical to the known DDT and BHC standards indicated their presence. Quantitative evaluation is made by comparison with known amounts of standard compounds applied on the plate. The method is sensitive to a concentration of 0.01 mg/m^3 pesticide in air.

72-1338. Hunter, C. G.; Robinson, J.; Bedford, C. T.; Lawson, J. M. (Turnstall Lab., Broad Oak Rd., Sittingbourne, Kent, England). **Exposure to chlorfenvinphos by determination of a urinary metabolite.** *J. Occup. Med. 14(2): 119-122; 1972.* (10 references)

A method is described for attempting to measure human exposure to chlorfenvinphos, 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate, by determination of the urinary metabolite DEC, desethyl chlorfenvinphos. A 20 ml urine sample, treated according to the method of Horning *et al.*, was acidified and salt saturated, and then extracted with ether. The evaporated ether extract was methylated with diazomethane in 1:1 ether-methanol. The methyl desethyl chlorfenvinphos (MDEC) was analyzed on a Pye model 104 gas chromatograph equipped with a flame photometric phosphorus detector. Recoveries ranged from 94 to 102%. Urinary levels of α- and β-MDEC were determined following administration of 3 mg/day for 53 days of Supona, a mixture of 86.4% β-chlorfenvinphos and 10.6% α-chlorfenvinphos. The levels of β-MDEC (100 to 230 μg/day during exposure) obtained were lower than the 23.8% reported for a dose four times greater. It was concluded that at a level of exposure of 3 mg/day the method would lack sufficient sensitivity.

72-1339. Fomicheva, L. G.; Yefimova, L. I, (Moscow Regional Plant Protection Station, Moscow, USSR). **Opredeleniye ostatochnykh kolichestv kel'tana v ogurtsakh metodom tonkosloynoy khromatografii. [Determination of kelthane (dicofol) residues in cucumbers by means of thin-layer chromatography.]** *Khim. Sel. Khoz. 9(9): 685-687; 1971.* (3 references) (Russian)

Kelthane (dicofol) was determined in cucumbers by thin-layer chromatography on alumina or silica gel. The samples were extracted with *n*-hexane, dried with anhydrous sodium sulfate and concentrated prior to chromatography. The developing solvents were benzene or hexane alone, benzene and acetone, hexane and acetone, or chloroform and glacial acetic acid, each combination used in 9:1 proportions respectively. The plates were sprayed with a solution of 0.5 g silver nitrate in 5 ml distilled water, 5 ml ammonium hydroxide, and 90 ml acetone. The plates were then exposed to UV for 10 to 15 min and the appearance of gray-black spots indicated the presence of dicofol. Applications of this

procedure to washed cucumber samples collected from fields treated with 0.1 to 0.2% solution of this pesticide revealed the presence of 0.1 mg/kg dicofol nine days following treatment.

72-1340. Klisenko, M. A.; Shmigidina, A. M. (All-Union Research Inst. for Hygiene and Toxicology of Pesticides, Polymers and Plastics, USSR). **Khromatograficheskoye opredeleniye akreksa v rastitel'nykh ob"yektakh. [Chromatographic determination of acrex (dinobuton) in plant samples.]** *Khim. Sel. Khoz. 9(9): 761-762; 1971.* (6 references) (Russian)

Acrex (dinobuton) was determined in apples and cucumbers by thin-layer chromatography. Samples of 50 g were extracted with *n*-hexane at low temperature (ice and salt mixture). The extracts were filtered through anhydrous sodium sulfate and the solvent distilled. In the case of apples, waxy compounds were removed by dissolving the hexane residue in acetone, followed by filtration and removal of the acetone by a stream of air. This residue was then dissolved in 0.2 ml of cold acetone. Thin-layer plates were prepared from a slurry of 14 g silica gel, 1.0 g powdered Zn (both 100 mesh-sieved) and 1.5 g previously dried calcium sulfate in 40 ml of distilled water. The samples were applied to the plates and chromatographed in hexane:acetone (4:1). After drying, the plates were sprayed with a 0.25% ninhydrin solution in ethanol:glacial acetic acid (10:1). After heating for 5 min at 100°C a pink spot (*Rf* 0.49) on an orange background indicated the presence of dinobuton. The procedure is specific for nitro compounds and it is sensitive to 0.06 mg/kg and 0.1 mg/kg in cucumbers and apples respectively. It can also be used for *p*-nitrophenol (*Rf* 0.13, red spot) and dinocap (*Rf* 0.50, violet spot).

72-1341. Weinmann, W. D. (Biologische Bundesanstalt, Laboratorium fuer Chemische Mittelpruefung, Braunschweig, Germany). **Quantitative Auswertung von Biotesten zur Bestimmung von Pflanzenschutzmittelrueckstaenden. [Quantitative evaluation of bioassays for determining residues of plant-protection agents.]** *Nachrichtenbl. Deut. Pflanzenschutzdienstes 23(10): 145-149; 1971.* (4 references) (German)

Although supplanted by more accurate and specific physico-chemical tests in many instances, bioassays are still sometimes used as a method for pesticide residue determination. Most commonly, an extract of the tissue being analyzed is evaporated almost to dryness, and a number of fruit flies are placed on the residue layer. The number of moribund flies within 24 hr is determined, and used in calculating the LD50 or another indicative value. Two statistical evaluation methods for the bioassay are suggested in the present report: calculation of a regression equation for a dose-effect curve, and evaluation by means of two dose-effect curves run simultaneously. The sources of error for each evaluation method are investigated with the aid of variance analysis. One evaluation procedure will prove to be preferable in each case, and adaptation of the experimental setup to the evaluation method selected will offer the most reliable results possible with a minimum of experimental effort and evaluation time.

72-1342. Davidek, J.; Seifert, J. (Institut fuer Lebensmittelchemie der Chemisch-Technologischen Hochschule, Prague 6, Czechoslovakia). **Enzymatische Bestimmung von Organophosphat-Insektiziden in pflanzlichem Material mit Hilfe der polarographischen Methode. [Enzymatic determination of organophosphate insecticides in vegetable matter by a polarographic method.]** *Nahrung 15(6): 691-695; 1971.* (5 references) (German)

Polarographic enzyme analysis offers advantages for the determination of organophosphate insecticides (cholinesterase inhibitors) in vegetable matter in that the sample workup need not be so exacting as that required for the spectrophotometric method. The use of absolute ethanol in all steps of the homogenization and decantation of the plant sample inactivates those enzyme systems contained in the vegetable matter which could appreciably hydrolyze the substrate used in the enzymatic determination. Chlorophyll, carotenes, xanthophylls and anthocyanidines contained in the tested plants do not interfere with organophosphate determination by the present method. The influence of natural inhibitors in the vegetable extracts must be taken into account in evaluating the results obtained.

72-1343. Bevenue, A.; Kawano, Y.; DeLano, F. (Dept. of Agricultural Biochemistry, U. of Hawaii, Honolulu, HI 96822). **Analytical studies of pyrethrin formulations by gas chromatography.** *Pyrethrum Post 11(1): 41-47; 1971.* (18 references)

A method is described for the simultaneous determination of pyrethrin I, piperonyl butoxide (PBO) and *n*-octyl bicycloheptene dicarboximide (NOBD) in pesticide formulations. Appropriate amounts of sample were taken into hexane and transferred to a column containing anhydrous sodium sulfate and Florisil. The pyrethrins and synergistic compounds were eluted with acetone, and following evaporation of acetone the residue was taken up in carbon disulfide for gas chromatographic analysis. A Varian Aerograph Series 1200, flame ionization detector was used. With the exception of aerosol samples, which required a 3% SE-30 silicone column, most samples were separated and measured on columns of 5% SE-30 silicone on Chromosorb W, 60 to 80 mesh. The method can meet the analytical restrictions of the Association of American Pesticide Control Officials when the individual ingredients are $< 49.99\%$.

72-1344. Chamberlain, J. (Searle Scientific Services, Lane End Road, High Wycombe, Bucks, England). **The**

determination of urinary 6-oxygenated cortisol in evaluating liver function. *Clin. Chim. Acta 34: 269-271; 1971.* (3 references)

The measurement of urinary 6β-hydroxycortisol can be used to monitor exposure to substances including pesticides which induce hepatic microsomal hydroxylating enzymes. Since 6β-hydroxycortisol is not stable under normal gas chromatographic conditions, a stable derivative must be formed for analysis. In the present method, a crude urine extract was oxidized with chromium trioxide in sulfuric acid to form androst-4-ene-3,6,11,17-tetrone, which is stable during gas chromatography and has strong electron-capturing properties, thus permitting rapid analysis of small urine volumes. The mean 24-hour excretion value of 255 μg found in ten normal male laboratory workers was recalculated, based on the A-ring reduced metabolites in the same urine sample, as determined by the method of Metcalf, giving a mean value of 30.7 μg 6-oxysteroid per mg reduced steroid. Similar values were found for employees of a chemical company in Amsterdam who were not occupationally exposed to pesticides and workers exposed to aldrin and dieldrin; a third group exposed to endrin, however, had a mean value of 91.0 μg/mg.

72-1345. Murano, A.; Nagase, M. (Takarazuka Research Lab., Sumitomo Chemical Co., Ltd., 4-2-1 Takatsukasa, Takarazuka-shi, Hyogo-ken, Japan). **Quantitative determination of a new synthetic pyrethroid, furamethrin.** *Agr. Biol. Chem. (Tokyo) 36(1): 101-105; 1972.* (15 references)

Furamethrin (5-propargyl-2-furylmethyl-*dl-cis,trans*-chrysanthemate) was determined quantitatively by a combination of thin-layer chromatography and UV spectrophotometry. Samples were applied to Kieselgel HF254 and developed with *n*-hexane:isopropyl ether:dioxane (90:7:5). Furamethrin, *Rf* 0.5, was visualized by UV and eluted with methanol. To this eluate, 0.5 *N* KOH was added and the absorbance was measured at 266 nm. It is believed that the compound rearranges to an allene in alkaline solution. The molar absorbancy of the *trans* isomer was equal to that of the *cis* isomer. Consequently, total furamethrin was determined, with recovery greater than 99.5% with a standard deviation of 0.35%.

72-1346. Kynast, G.; Hahn, H. (Schering AG, Zentrale Analytik, Werk Wolfenbuettel, 334 Wolfenbuettel, Germany). **Amperometric method for the determination of propham.** *Analyst (London) 96(1138): 85-87; 1971.* (2 references)

An amperometric diazotization titration for the determination of active material in technical propham has been investigated. Advantages in comparison with the official CIPAC method are the smaller amount of sample required, the reduced time of hydrolysis and analysis, automation of titration, more accurate evaluation and better reproducibility because no extraction is necessary. The standard deviation was 0.52 compared with 1.04 obtained with the CIPAC method. In addition, the method has been tested successfully with other carbamates and their formulations. (Author abstract by permission)

72-1347. Lee, D. F.; Roughan, J. A. (Ministry of Agriculture, Fisheries and Food, Plant Pathology Lab., Hatching Green, Harpenden, Herts., England). **Improvements to the nitrite-diazo dye (Blom's) method of determining hydroxylamine as used in the determination of residues of aldicarb.** *Analyst (London) 96(1149): 798-801; 1971.* (4 references)

The determination of hydroxylamine by Blom's method (oxidation with iodine to nitrite, which is then made to form a diazo dye) has been used for determining residues of aldicarb; however, the previous results were not highly reproducible. The precision of the method can be improved by making two changes in the procedure: first, replacement of the acetate buffer by sodium dihydrogen phosphate, which makes small volume errors in reagent dispensing much less crucial; and second, physical removal of excess iodine from the reaction mixture by extraction into benzene rather than chemical nuetralization with sodium thiosulfate. Chemical reduction has the disadvantages of producing turbidity due to colloidal sulfur formation, thus interfering with optical density readings; and allowing the development of ionic species which lead to decomposition of the diazo ion, making the color which develops unstable. The optical density of the dye solution in contact with the bromobenzene-iodine solution remains stable for several hours. Finally, since the former coupling reagent (1-naphthylamine) was regarded as a potential carcinogen, it was replaced by 1-naphthylethylenediamine.

72-1348. Pionnat, J. C. (Station de Pathologie Vegetale, Centre de Recherches d'Antibes, I.N.R.A., 06-Antibes, France). **Mise en evidence du benomyl et du *Phialophora cinerescens* (Wr.) van Beyma dans les tiges d'oeillets plantes en sols infectes et traites. [Detection of benomyl and *Phialophora cinerescens* (Wr.) van Beyma in stems of carnations grown in infected and treated soils.]** *Ann. Phytopathol. 3(2): 207-214; 1971.* (14 references) (French)

Benomyl (MBBC) and its derivative, methyl-2-benzimidazole carbamate (MBC) were detected in carnation plants by thin-layer chromatography. Powdered cellulose was used as the substrate and acetone or diethylketone:benzene (3:7) as the solvent; the spots were visualized by fluorescence under UV. For quantitative determination, 4-cm pieces of carnation stems, comprising the parts of the plant between 2 and 6 inches from the ground, were dried and powdered, then extracted with chloroform or chloroform-acetone. The

desired quantity of the extract was placed on a filter paper disk, which was then set in the center of a Petri dish filled with malt agar, previously inoculated with a suspension of the spores of *Phialophora cinerescens*. The diameter of the zone of inhibition was measured after 6 days of incubation at 16°C, and the corresponding quantity of MBC or MBBC read from a calibration curve. Extraction of treated plants with acetone:chloroform (9:1) gave 80% recovery of pesticide. Treatment of plant soil with 0.25, 0.37, or 0.50 g/m^2 of MBB every 15 days resulted in attainment of a maximum of about 3 μg/g dry plant in 1 week, followed by a slight drop.

72-1349. Kaufman, W. M. (Oregon State U., Corvallis, OR). **Identification of some chlorinated pesticides by ultraviolet degradation.** *Diss. Abstr. Int. 32(4): 2218-B. 1971.*

The feasibility of identifying pesticides via their degradation products following laboratory irradiation was investigated with particular reference to the chlorinated hydrocarbon insecticides. A gas-liquid chromatograph with an electron-capture detector was fitted with a Teflon post-column splitter system which prevented pesticide degradation and split the effluent from a four-foot column between detector and atmosphere. Sample components were trapped in Teflon tubes as they eluted from the column, and were then condensed with dry ice. After trapping of a component, hexane was added, the sample irradiated through the Teflon tube under laboratory UV, and the degradation products were then analyzed. Reproducible peak patterns were obtained for each pesticide. The combined phoytolysis-GLC method offers an ideal means for dealing with the problem of artifacts extracted along with pesticides from natural materials, and for quantitation of pesticide combinations with overlapping GLC peaks, such as DDT and toxaphene. The multiple trapping technique developed may also be applicable to other analytical methods such as IR or mass spectrometry. (From author abstract by permission. Copies of the thesis are available from University Microfilms, Order No. 71-25,066).

72-1350. Fidelus, J.; Zietek, M.; Mikolajek, A. (Institut fuer Toxicologie und Forensische Chemie der Medizinischen Akademie in Krakow, Poland). **Direkte polarographische Bestimmung von Sintrom (Acenocumarol) in Leichenblut. [Direct polarographic determination of Sintrom (acenocumarin) in cadaver blood.]** *Fresenius Z. Anal. Chem. 256(2): 131-132; 1971.* (4 references) (German)

To study the polarographic behavior of Sintrom in biological material, Sintrom was added to liquid blood at 20, 40, 60, 80, and 100 μg/ml. Polarographic readings were performed on one series of such blood samples immediately after Sintrom addition, and on a second series after drying for two days at room temperature. Sintrom content was also investigated in blood taken from rats two hours after administration of Sintrom at 50 mg/kg by gastric catheter, with or without prior frozen storage of the blood samples. For the determination, homogenized blood was mixed with Britton-Robinson buffer, reducing mixture (containing Metol and hydroquinone), gelatine solution, and *n*-octyl alcohol in methanol. After removal of air with a nitrogen stream, polarography was performed using a dropping mercury electrode in the range from -0.4 to -1.2 V. The current was proportional to concentration in the range of 20 to 100 μg/ml blood. The limit of detection was 10 μg Sintrom in 1 ml blood. The Sintrom concentrations in rat blood after a single oral dose of 50 mg/kg ranged from 87 to 114 μg/ml. Sintrom was polarographically stable to both drying and storage as tested.

72-1351. Keil, R. (Eidgenoessische Institut fuer Reaktorforschung, Wuerenlingen, Switzerland). **Hochselektive spektralphotometrische Bestimmung von Thallium mit Natriumdiaethyldithiocarbamidat. [Highly selective spectrophotometric determination of thallium with sodium diethyldithiocarbamidate.]** *Fresenius Z. Anal. Chem. 258(2): 97-99; 1972.* (5 references) (German)

The spectrophotometric determination of thallium as Tl(III)-diethyldithiocarbamate can be improved substantially by transformation of the Tl-complex (extracted in carbon tetrachloride) into the Cu-complex. By this modification the sensitivity of the method is enhanced by a factor of about 20. A procedure has been worked out, which allows the specific determination of Tl in many materials. Of 60 cations and 13 anions tested only Bi interferes with the Tl determination. (Author abstract by permission.)

72-1352. Ozan, K.; Ceylan, S. (Ankara U., Veteriner Fakueltesi Farmakoloji ve Toksikoloji Kursusu, Ankara, Turkey). **Organik fosforlu insektisitlerin beyaz farelerde biyolojik yolla teshisi. [Identification of organophosphorus pesticides by means of a bioassay performed on white mice.]** *Ankara Univ. Vet. Fak. Derg. 17(2): 214-220; 1970.* (10 references) (Turkish)

A biological test for the identification of organophosphate insecticide poisoning is presented. The procedure is based on the observation that white mice develop a white pellicule on their eyes following feeding with residues extracted from organophosphorus insecticide-poisoned animal organs. Treatment with atropine leads to immediate disappearance of the pellicule. Mice treated with only organophosphorus insecticide solutions exhibited a similar response. All these observations were verified by chemical procedures. The assay is recommended for use in toxicology laboratories for the rapid identification of poisoning by organophosphorus insecticides.

72-1353. Kratky, B. A.; Warren, G. F. (Dept. of Horticulture, Purdue U., Lafayette, IN). **The use of three simple, rapid bioassays on forty-two herbicides.** *Weed Res. 11(4): 257-262; 1971.* (18 references)

The efficacy of three rapid bioassays in the determination of 42 herbicides representing various classes was investigated. The techniques were a *Chlorella* bioassay, a root bioassay with sorghum, oat and cucumber, and a shoot bioassay with sorghum and oat; the tests required 1, 2 and 4 days respectively. Thirty-one of the herbicides provided a 50% or greater inhibition of growth in at least one of the bioassays at 1 ppm. Only chlorpropham was detected at 1 ppm or less by all three methods. Of the remaining eleven herbicides, seven were detectable at 10 ppm, two at 20 ppm, and two at 30 ppm. The *Chlorella* bioassay was generally highly sensitive to herbicides whose mode of action comprised photosynthetic or respiratory inhibition, whereas the root and shoot bioassays were more sensitive to herbicides with other mechanisms. Assays employing similar methodology but different test organisms might prove more advantageous in a given case. Simultaneous employment of the three methods described here could constitute a screening method for herbicidal activity.

See also **72-1166** **72-1176** **72-1193** **72-1224**

HAPAB QUARTERLY INDEX

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PREFACE

The basic design for this index was supplied by the Division of Pesticide Community Studies. It consists of two author indexes (personal and corporate) and two subject indexes (compound and concept).

Compounds are indexed by their common names; where other compound designations are used by authors, these synonyms appear with the notation to *see* the common name. Articles referring, in general, to structural or functional chemical classes are indexed under these broader headings (e.g., organochlorines, herbicides, etc.).

Subheadings in the compound index are identical with the main headings in the concept index, the latter having a maximum of three levels of specificity in addition to the compound.

Following is a cross-referenced guide to the subject headings:

Alternative Controls
Analysis
Antidotes (*see* Treatment of Poisoning)
Associations/Organizations
Beneficial Effects
Biochemical Effects (*see also* Enzyme Activity)
Blood/Body Fluids
Carcinogenesis
Cardiovascular System
Cholinesterase (*see* Enzyme Activity)
Cholinesterase-Measurement (*see* Analysis - Cholinesterase/Enzyme)
Chromatography (*see* Analysis - Chromatography)
Conferences
Cytological Effects
Decontamination (*see* Residue Removal)
Degradation (*see* Residue Degradation *and* Metabolism)
Dermal Effects (*see* Integument)
Diet (*see* Factors Influencing Metabolism/Toxicity - Nutritional State)
Digestive System
Domestic Animals (*see* Toxicity/Domestic Animals *and* Residues/Domestic Animals)
Economics
Education/Training (*see also* Prevention)
Embryology (*see* Reproduction/Growth - Embryo/Fetus)
Endocrine System (*see also* Reproduction/Growth)
Environmental Pollution
Enzyme Activity (*see also* Biochemical Effects)
Excretory System
Experimental Animals (*see* Toxicity/Experimental Animals)
Experimental Design
Factors Influencing Metabolism/Toxicity
Food and Feed (*see* Residues/Food and Feed)
Human exposure (*see* Toxicity/Humans *and* Residues/Humans)
Immunology
Integument
Interactions (*see* Factors Influencing Metabolism/Toxicity)
Laws and Regulations (*see also* Prevention)
LD50 (*see* Toxicity/Experimental Animals)
Metabolism (*see also* Residue Degradation)
Microscopy, light and electron (*see* Cytological Effects)
Morbidity and Mortality Statistics
Musculoskeletal System
Mutagenesis/Teratogenesis (*see also* Reproduction/Growth)
Nervous System
Nomenclature
Photodecomposition (*see also* Residue Degradation)
Plants (*see* Residues/Plants)
Prevention (*see also* Laws and Regulations *and* Education/Training)
Reproduction/Growth (*see also* Endocrine System *and* Mutagenesis/Teratogenesis)
Residue Degradation (*see also* Photodecomposition *and* Metabolism)
Residue Dynamics
Residue Removal
Residues/Air
Residues/Domestic Animals
Residues/Food and Feed
Residues/Human
Residues/Plants (other than food and feed)
Residues/Soil
Residues/Water
Residues/Wildlife
Respiratory System
Reviews
Sensory System
Skeleton (*see* Musculoskeletal System)
Soil (*see* Residues/Soil)
Teratogenesis (*see* Mutagenesis/Teratogenesis)
Toxicity/Domestic Animals
Toxicity/Experimental Animals
Toxicity/Humans
Toxicity/Wildlife
Therapeutic Use
Treatment of Poisoning
Water (*see* Residues/Water)
Wildlife (*see* Residues/Wildlife)

Abate
see also Organophosphates
Enzyme activity
72-1029
Factors Influencing Metabolism/Toxicity
72-1029
Toxicity/Experimental Animals
72-1029 72-1244
Acenocumarol
see also Rodenticides
Analysis
72-1350
Acrex
see Dinobuton
Acrofol
see also Herbicides
Analysis
72-1100
Residue/Air
72-1100
Aldicarb
see also Carbamates
Analysis
72-1347
Metabolism
72-0796
Residue Degradation
72-0717
Residues/Plants
72-0717
Residues/Water
72-0717
Residues/Wildlife
72-0717
Reviews
72-0796
Toxicity/Wildlife
72-0717
Aldrin
see also Organochlorines
Alternative Controls
72-1153
Analysis
72-0688 72-0874
72-1319 72-1321
72-1330 72-1331
72-1344
Biochemical Effects
72-1041 72-1081
Blood/Body Fluids
72-1088
Carcinogenesis
72-0660
Cytological Effects
72-1081 72-1344
Education/Training
72-0660
Environmental Pollution
72-0912
Enzyme activity
72-1241 72-1242
Factors Influencing Metabolism/Toxicity
72-0807 72-1088
Laws and Regulations
72-0902 72-1147
72-1153
Metabolism
72-1057 72-1081
72-1088 72-1282
Morbidity and Mortality Statistics
72-0974
Mutagenesis/ Teratogenesis
72-0660 72-0783
Nervous System
72-0783 72-1041
Photodecomposition
72-1191
Reproduction/Growth
72-1188 72-1209
72-1344
Residue Degradation
72-0954 72-1191
Residue Removal
72-1172
Residue/Air
72-0688
Residues/Domestic Animals
72-1209
Residues/Food and Feed
72-0874 72-0943
72-0954 72-1198
72-1209
Residues/Humans
72-1188 72-1198
Residues/Soil
72-0713 72-1186
Residues/Water
72-0713 72-1178
72-1186
Reviews
72-1153
Toxicity/Domestic Animals
72-1209
Toxicity/Experimental Animals
72-0783 72-0807
72-1209
Toxicity/Humans
72-0974 72-1344
Toxicity/Wildlife
72-0912 72-1178
Treatment of Poisoning
72-0974
Alicep
see Chlorbufam
see Pyrazon
Alkyl sevin 67
see 2-Methyl-1-naphthyl N-methyl carbamate
Allethrin
see also Botanicals
Pyrethrins
72-0857 72-1050
Analysis
72-1166
Blood/Body Fluids
72-1078
Enzyme activity
72-1078
Nervous System
72-1078
Residue/Air
72-1166
Allyl alcohol
see also Fumigants
Reproduction/Growth
72-1283
Aminocarb
see also Carbamates
Laws and Regulations
72-0678
Metabolism
72-0796 72-1254
Reviews
72-0796
Aminotriazole
see Amitrole
Amitrole
see also Herbicides
Analysis
72-0720
Laws and Regulations
72-0684
Photodecomposition
72-0720
Residue Degradation
72-0720
Residues/Water
72-0720 72-1265
Toxicity/Experimental Animals
72-1265
ANIT
see alpha-Naphthyl isothiocyanate
Anthraquinone
see also Rodenticides
Factors Influencing Metabolism/Toxicity
72-0985
Nervous System
72-0985
Toxicity/Humans
72-0985
Treatment of Poisoning
72-0985
Antidotes
see also Pralidoxime
Biochemical Effects
72-1256
Blood/Body Fluids
72-1256

Enzyme activity
72-1256 72-1270
Toxicity/Experimental
Animals
72-1256
Antio
see Formothion
ANTU
see also Rodenticides
Digestive System
72-0738 72-0755
Excretory System
72-0738
Factors Influencing
Metabolism/Toxicity
72-0985
Nervous System
72-0755 72-0985
Respiratory System
72-0738
Toxicity/Domestic
Animals
72-0738
Toxicity/Humans
72-0755 72-0985
Treatment of Poisoning
72-0985
Aprocarb
see also Carbamates
Enzyme activity
72-0814
Metabolism
72-0814
Aramite
Carcinogenesis
72-0761
Aroclor 1221
see Polychlorinated
biphenyls
Aroclor 1242
see Polychlorinated
biphenyls
Aroclor 1254
see Polychlorinated
biphenyls
Arsenicals
see also Herbicides,
Fluor chrome arsenate
phenol
Analysis
72-0862
Carcinogenesis
72-0761
Factors Influencing
Metabolism/Toxicity
72-1027
Laws and Regulations
72-0684 72-1128
Morbidity and Mortality
Statistics
72-0983
Mutagenesis/
Teratogenesis
72-1027
Nervous System
72-1233
Prevention
72-1189
Residue Removal
72-0963
Residues/Food and Feed
72-0937 72-0962
72-1198
Residues/Humans
72-1189 72-1198
Reviews
72-0992 72-1128
Toxicity/Domestic
Animals
72-0983 72-0992
Toxicity/Humans
72-1233
Treatment of Poisoning
72-0992
Atratone
Residues/Soil
72-0944
Atrazine
see also Herbicides
Analysis
72-0877
Cardiovascular System
72-1309
Cytological Effects
72-1309
Digestive System
72-1309
Endocrine System
72-1309
Excretory System
72-1309
Factors Influencing
Metabolism/Toxicity
72-0816
Metabolism
72-0816 72-1001
72-1047 72-1287
Mutagenesis/
Teratogenesis
72-0816
Nervous System
72-1309
Photodecomposition
72-0716
Reproduction/Growth
72-0816 72-1001
72-1309 72-1310
Residue Degradation
72-0716 72-0928
Residues/Soil
72-0716 72-0816
72-0877 72-0928
72-0944 72-1190
Respiratory System
72-1309
Reviews
72-1287
Toxicity/Experimental
Animals
72-1309 72-1310
Avadex
see Di-allate
Azatox
Morbidity and Mortality
Statistics
72-0974
Toxicity/Humans
72-0974
Treatment of Poisoning
72-0974
Azinphosmethyl
see also Organophosphates
Blood/Body Fluids
72-1073
Enzyme activity
72-1073
Prevention
72-0741
Reproduction/Growth
72-1288
Toxicity/Experimental
Animals
72-1288
Toxicity/Humans
72-0741 72-1073
Treatment of Poisoning
72-0741
Banol
see also Carbamates
Metabolism
72-0796
Reviews
72-0796
Barban
see also Carbamates,
Herbicides
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Metabolism
72-1021 72-1058
Toxicity/Experimental
Animals
72-1021 72-1044
Baygon
see Aprocarb
see Propoxur
BCPE
see
Dichlorodiphenylethanol
Benomyl
see also Fungicides
Analysis
72-1348
Residues/Plants
72-1348
Benthiocarb
see also Carbamates

Analysis
72-0840
Residues/Soil
72-0840

BHC
see also Organochlorines
Polychloropinene
72-0940
Analysis
72-0844 72-0870
72-1196 72-1296
72-1337
Blood/Body Fluids
72-0971 72-1296
Carcinogenesis
72-1012
Cardiovascular System
72-0970
Digestive System
72-0970 72-1012
Environmental Pollution
72-0673 72-0674
72-0693 72-0697
Enzyme activity
72-0792
Excretory System
72-1296
Factors Influencing Metabolism/Toxicity
72-0970 72-1299
Immunology
72-1019
Integument
72-1269
Laws and Regulations
72-0673 72-0674
72-0697 72-1147
Metabolism
72-1296
Nervous System
72-0970 72-1296
Prevention
72-0940
Residue/Air
72-1203 72-1296
Residues/Food and Feed
72-0673 72-0674
72-0693 72-0697
72-0844 72-0870
72-0940 72-0943
72-0950 72-1196
72-1198 72-1199
Residues/Humans
72-0673 72-0674
72-0946 72-1198
72-1199
Residues/Plants
72-0950 72-1201
Residues/Soil
72-0674 72-0693
72-0940 72-0952
Residues/Water
72-0674
Respiratory System
72-0970 72-1269
72-1296
Toxicity/Experimental Animals
72-0792 72-1269
72-1299
Toxicity/Humans
72-0673 72-0674
72-0792 72-0970
72-0971

alpha-BHC
see BHC isomers

beta-BHC
see BHC isomers

delta-BHC
see BHC isomers

gamma-BHC
see Lindane

BHC isomers
see also Organochlorines
Analysis
72-0688
Biochemical effects
72-0801
Carcinogenesis
72-1300
Cytological effects
72-0801
Digestive System
72-0801
Enzyme activity
72-0801
Metabolism
72-1300
Morbidity and Mortality Statistics
72-1195
Reproduction/Growth
72-0947
Residue Degradation
72-0692 72-0694
Residue Dynamics
72-0694
Residue/Air
72-0688 72-0692
Residues/Domestic Animals
72-0694
Residues/Food and Feed
72-0694 72-1197
Residues/Humans
72-0694 72-1195
72-1197 72-1202
Residues/Soil
72-0692
Residues/Water
72-0692
Residues/Wildlife
72-0694 72-0947
Toxicity/Experimental Animals
72-0801
Toxicity/Experimental Animals
72-1300
Toxicity/Wildlife
72-0947

Binapacryl
see also Nitro compounds
Cardiovascular System
72-1218
Immunology
72-1218
Integument
72-1218
Residues/Humans
72-1218
Respiratory System
72-1218
Toxicity/Humans
72-1218
Treatment of Poisoning
72-1218

Bioresmethrin
see Pyrethrins

Biphenyl
see also Fungicides
Analysis
72-1122

Botanicals
see also Allethrin, Furamethrin, Nicotine, Nicotine sulfate, Pyrethrins, Rotenone

Brestan
see Fentin acetate

Bromophos
see also Organophosphates
Toxicity/Experimental Animals
72-1244

Bubulin
see Trichlorfon

Butacarb
see also Carbamates
Enzyme activity
72-0814
Metabolism
72-0814

Butylate
see also Herbicides
Residue Degradation
72-1170
Residues/Soil
72-1170

2-sec-Butylphenyl N-methylcarbamate
see Carbamates

Butyphos
see DEF

Bux
see also Carbamates
Metabolism
72-0960
Residue Degradation
72-0960

Calcium chlorate-chloride
Analysis
72-1100
Residue/Air
72-1100
Calcium cyanide
see also Fumigants
Alternative Controls
72-1138
Prevention
72-1138
Captan
see also Fungicides
Metabolism
72-1249
Mutagenesis/
Teratogenesis
72-0780
Toxicity/Experimental
Animals
72-0780
Carbamates
see also Herbicides, Aldicarb, Aminocarb, Aprocarb, Banol, Barban, Benthiocarb, Butacarb, Bux, Carbaryl, Carbetamide, Carbofuran, Chloro-IPC, Chlorpropham, Di-allate, Dibam, Dicresyl, 3,5-Diisopropylphenyl N-methylcarbamate, Dimetilan, 2-(1,3-Dioxolane-2-yl)-phenyl-N-methylcarbamate, EPTC, IPC, Isolan, 3-Isopropylphenyl N-methylcarbamate, Landrin, Methiocarb, Methomyl, Mobam, MTMC, Propoxur, Pyrolan, Thiram, Zectran, Ziram
Analysis
72-0795 72-0851
72-0879 72-0880
72-0882 72-1116
72-1196 72-1315
72-1320 72-1325
72-1326
Digestive System
72-0773
Endocrine System
72-1258
Enzyme activity
72-0773 72-0795
72-1051
Laws and Regulations
72-0903
Musculoskeletal System
72-0773
Nervous System
72-0773
Prevention
72-0745
Residue Degradation
72-0953
Residues/Food and Feed
72-0934 72-0953
72-1196
Residues/Humans
72-0773
Residues/Soil
72-0934
Reviews
72-0795
Sensory System
72-0773
Toxicity/Experimental
Animals
72-1258
Toxicity/Humans
72-0740 72-0773
Treatment of Poisoning
72-0773
Carbaryl
see also Carbamates
Analysis
72-0887 72-1106
72-1112
Biochemical Effects
72-0830 72-1016
72-1081
Blood/Body Fluids
72-0757 72-0817
72-0818 72-0830
Cytological Effects
72-1081
Endocrine System
72-0757 72-0818
72-0830 72-1016
Enzyme activity
72-0722 72-0814
72-1016 72-1072
Factors Influencing
Metabolism/Toxicity
72-1072
Immunology
72-1024
Laws and Regulations
72-0678
Metabolism
72-0796 72-0814
72-1005 72-1081
72-1112 72-1254
Nervous System
72-0757
Reproduction/Growth
72-1016 72-1209
72-1247
Residue Degradation
72-0701 72-0717
Residues/Domestic
Animals
72-0722 72-0887
72-1209
Residues/Food and Feed
72-0722 72-0887
72-0924 72-1209
Residues/Plants
72-0717
Residues/Water
72-0717
Residues/Wildlife
72-0717
Reviews
72-0796
Toxicity/Domestic
Animals
72-1209
Toxicity/Experimental
Animals
72-0757 72-0817
72-0818 72-0830
72-1016 72-1024
72-1072 72-1209
72-1247
Toxicity/Wildlife
72-0717
Carbaryl derived compounds
Enzyme activity
72-1072
Factors Influencing
Metabolism/Toxicity
72-1072
Toxicity/Experimental
Animals
72-1072
Carbetamide
see also Carbamates, Herbicides
Analysis
72-1115
Carbofuran
see also Carbamates
Metabolism
72-0796 72-1059
Residue Degradation
72-0717
Residues/Plants
72-0717
Residues/Water
72-0717
Residues/Wildlife
72-0717
Reviews
72-0796
Toxicity/Wildlife
72-0717
Carbon Tetrachloride
Biochemical Effects
72-1293
Metabolism
72-1293
Toxicity/Experimental
Animals
72-1293
Carbophenothion
see also Organophosphates

Blood/Body Fluids
72-1073
Enzyme activity
72-1073
Toxicity/Humans
72-1073
Carbyne
see Barban
Castrix
see Crimidine
Celatox
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Toxicity/Experimental Animals
72-1044
Chloralose
see also Rodenticides
Factors Influencing Metabolism/Toxicity
72-0985
Nervous System
72-0985
Toxicity/Humans
72-0985
Treatment of Poisoning
72-0985
Chlorazine
Metabolism
72-1287
Reviews
72-1287
Chlorbromuron
see also Herbicides
Analysis
72-0863
Chlorbufam
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Toxicity/Experimental Animals
72-1044
Chlordane
see also Herbicides, Organochlorines
Analysis
72-1329
Associations/ Organizations
72-0905
Biotransformation
72-1056
Cytological Effects
72-1014
Digestive System
72-1014
Enzyme activity
72-0774 72-1014
Factors Influencing Metabolism/Toxicity
72-0807 72-1014
Laws and Regulations
72-0684 72-0905
72-1146
Metabolism
72-0715 72-1056
Residues/Water
72-0715
Toxicity/Experimental Animals
72-0774 72-0807
72-1146
Toxicity/Humans
72-0905
alpha-Chlordane
see Chlordane
Chlordane derived compounds
Biotransformation
72-1056
Metabolism
72-1056
gamma-Chlordane
see also Organochlorines
Analysis
72-1329
Chlordecon
see also Organochlorines
Residues/Soil
72-0690
Chlorfenvinphos
see also Organophosphates
Analysis
72-1338
Enzyme activity
72-0790
Factors Influencing Metabolism/Toxicity
72-0781 72-0790
72-1301
Metabolism
72-0781
Residues/Humans
72-1338
Reviews
72-0781
Toxicity/Experimental Animals
72-0790 72-1301
72-1303
Toxicity/Wildlife
72-0781
Chlormequat Chloride
see also Herbicides
Residues/Food and Feed
72-0939
cis-beta-Chloroacrylic acid sodium salt
see Acrofol
4-Chloro-2-butynyl-3-chlorocarbanilate
see Barban
Chlorofos
see Trichlorfon
Chloro-IPC
see also Carbamates
Laws and Regulations
72-1147
Metabolism
72-1021
Toxicity/Experimental Animals
72-1021
Chloro-isopropyl-N-phenylcarbamate
see Chloro-IPC
Chlorophenothane
see DDT
p-Chlorophenyl-p-chlorobenzene sulfonate
see Ovex
4-Chlorophenyl-2,4,5-trichlorophenylazosulfide
see CPAS
Chlorophos
see Trichlorfon
3-Chloropropionic acid
see also Herbicides
Metabolism
72-0784
Chlorphos
see Trichlorfon
Chlorpropham
see also Carbamates, Herbicides
Analysis
72-1114 72-1322
Metabolism
72-0796
Residues/Food and Feed
72-1114
Reviews
72-0796
Ciodrin
see Crotoxyphos
Compound 4072
see Chlorfenvinphos
Conen
see also Fungicides, Organophosphates
Analysis
72-0854 72-0856
Residues/Food and Feed
72-0961
Copper oxychloride
see also Fungicides

Analysis
72-1327
Cotoran
see Fluometuron
Coumafene
see Warfarin
CPAS
see also Organochlorines
Analysis
72-1097
Residue/Air
72-1097
Residues/Soil
72-1097
Residues/Water
72-1097
Cresotol
Morbidity and Mortality
Statistics
72-0974
Toxicity/Humans
72-0974
Treatment of Poisoning
72-0974
2-(o-Cresyl)-4H-1:3-benzodioxaphosphorin-2-oxide
see Tri-o-cresyl phosphate derived compounds
m-Cresyl N-methyl carbamate
see Dicresyl
p-Cresyl N-methyl carbamate
see Dicresyl
Crimidine
see also Rodenticides
Enzyme activity
72-1271
Factors Influencing Metabolism/Toxicity
72-1271
Nervous System
72-1271
Toxicity/Experimental Animals
72-1271
Crotoxyphos
see also Organophosphates
Enzyme activity
72-0790
Factors Influencing Metabolism/Toxicity
72-0790 72-1301
Reproduction/Growth
72-1209
Residues/Domestic Animals
72-1209
Residues/Food and Feed
72-1209
Toxicity/Domestic Animals
72-1209
Toxicity/Experimental Animals
72-0790 72-1209
72-1301 72-1303
Cupral
see Copper oxychloride
Cyanox
see also Organophosphates
Analysis
72-0855
Cyanuric acid
Carcinogenesis
72-1017
Digestive System
72-1017
Integument
72-1017
Cyolane
see also Organophosphates
Toxicity/Domestic Animals
72-0999
Cythioate
see also Organophosphates
Analysis
72-1318

2,4-D
see also Herbicides
Analysis
72-0720 72-0841
72-0845 72-0883
72-0945 72-1333
72-1334
Blood/Body Fluids
72-1229
Cytological Effects
72-1292
Excretory System
72-1292
Factors Influencing Metabolism/Toxicity
72-1034
Immunology
72-1229
Laws and Regulations
72-0681 72-1159
Metabolism
72-0779 72-0845
72-1034
Musculoskeletal System
72-1250
Mutagenesis/Teratogenesis
72-0779
Photodecomposition
72-0720
Reproduction/Growth
72-0779 72-1213
72-1310
Residue Degradation
72-0720 72-0926
Residue Dynamics
72-0926
Residues/Food and Feed
72-0945
Residues/Humans
72-0845
Residues/Soil
72-0926
Residues/Water
72-0720 72-0743
Residues/Wildlife
72-0743
Therapeutic use
72-1048
Toxicity/Domestic Animals
72-0743
Toxicity/Experimental Animals
72-1034 72-1292
72-1310
Toxicity/Humans
72-1229
Toxicity/Wildlife
72-0743 72-1213

2,4-D derived compounds
see also Herbicides
Analysis
72-0720
Photodecomposition
72-0720
Residue Degradation
72-0720
Residues/Water
72-0720

4,4'-D
see Dicofol derived compounds

Dacthal
see also Herbicides
Residues/Food and Feed
72-0934
Residues/Soil
72-0934
Dalapon
see also Herbicides
Analysis
72-0720
Photodecomposition
72-0720
Residue Degradation
72-0720
Residues/Water
72-0720 72-1265
Toxicity/Experimental Animals
72-1265
Dazomet
see also Fumigants
Reproduction/Growth
72-1283
DBP
see DDT derived compounds

2,4-DB
see also Herbicides
Analysis
72-1333
Endocrine System
72-1022
Mutagenesis/
Teratogenesis
72-1022
Reproduction/Growth
72-1022
Toxicity/Experimental
Animals
72-1022
DCNP
see Dichloronitrophenol
DDA
see DDT derived
compounds
o,p'-DDD
see TDE
DDE
see DDT derived
compounds
p,p'-DDE
see DDT derived
compounds
DDM
see DDT derived
compounds
DDT
see also Organochlorines
Alternative Controls
72-1153
Analysis
72-0688 72-0702
72-0708 72-0843
72-0844 72-0870
72-0920 72-1095
72-1103 72-1117
72-1196 72-1296
72-1337
Beneficial Effects
72-0662 72-0675
72-1158 72-1161
Biochemical Effects
72-0702 72-0786
72-0794 72-1053
72-1054 72-1065
72-1071 72-1081
72-1264
Blood/Body Fluids
72-0759 72-0971
72-1078 72-1088
72-1089 72-1229
72-1296
Carcinogenesis
72-0660 72-0761
72-1003
Conferences
72-0661
Cytological Effects
72-0776 72-1067
72-1081
Digestive System
72-0755 72-0808
72-1091 72-1216
Education/Training
72-0660
Endocrine System
72-0980 72-1071
Environmental Pollution
72-0662 72-0673
72-0674 72-0675
72-0697 72-0909
72-0912 72-0916
72-0917 72-0929
72-1127 72-1145
72-1156 72-1161
72-1162
Enzyme activity
72-0762 72-0774
72-0786 72-0792
72-0808 72-0810
72-0812 72-0813
72-1032 72-1065
72-1067 72-1070
72-1071 72-1078
72-1084 72-1089
72-1210 72-1241
72-1242 72-1253
Excretory System
72-0808 72-1032
72-1065 72-1071
72-1296
Factors Influencing
Metabolism/Toxicity
72-0776 72-0786
72-0807 72-0808
72-1007 72-1034
72-1075 72-1086
72-1088 72-1164
72-1264 72-1299
Immunology
72-0759 72-1024
72-1091 72-1216
72-1229
Laws and Regulations
72-0665 72-0672
72-0673 72-0674
72-0680 72-0697
72-0902 72-1140
72-1153 72-1158
Metabolism
72-0776 72-0804
72-0808 72-0812
72-0942 72-1011
72-1015 72-1034
72-1075 72-1079
72-1081 72-1085
72-1088 72-1091
72-1267 72-1268
72-1296
Morbidity and Mortality
Statistics
72-1195
Mutagenesis/
Teratogenesis
72-0660
Nervous System
72-0755 72-0808
72-0812 72-1015
72-1064 72-1067
72-1078 72-1090
72-1210 72-1216
72-1296
Photodecomposition
72-0706
Prevention
72-0940 72-0986
Reproduction/Growth
72-0762 72-0810
72-0827 72-1015
72-1042 72-1085
72-1086 72-1090
72-1173 72-1187
72-1198 72-1209
72-1257
Residue Degradation
72-0692 72-0702
72-0717 72-0804
72-0955 72-1011
Residue Dynamics
72-1164
Residue Removal
72-1145 72-1164
72-1169 72-1172
Residue/Air
72-0688 72-0692
72-1203 72-1296
Residues/Domestic
Animals
72-1168 72-1169
72-1209
Residues/Food and Feed
72-0672 72-0673
72-0674 72-0697
72-0698 72-0703
72-0843 72-0844
72-0870 72-0923
72-0937 72-0940
72-0950 72-1140
72-1145 72-1168
72-1183 72-1193
72-1196 72-1198
72-1199 72-1209
Residues/Humans
72-0673 72-0674
72-0689 72-0703
72-0920 72-0942
72-0946 72-1145
72-1161 72-1177
72-1188 72-1195
72-1198 72-1199
72-1202 72-1216
Residues/Plants
72-0717 72-0920
72-0950 72-1201

Residues/Soil
72-0674 72-0692
72-0940 72-1186
Residues/Water
72-0661 72-0674
72-0692 72-0703
72-0708 72-0709
72-0717 72-0909
72-1164 72-1186
Residues/Wildlife
72-0661 72-0703
72-0705 72-0717
72-0909 72-0929
72-1164 72-1173
72-1184 72-1187
Respiratory System
72-0808 72-1070
72-1296
Reviews
72-0662 72-1127
72-1153 72-1193
Sensory System
72-1090
Toxicity/Domestic Animals
72-1209
Toxicity/Experimental Animals
72-0774 72-0776
72-0786 72-0792
72-0807 72-0808
72-0812 72-0827
72-1015 72-1024
72-1034 72-1042
72-1064 72-1070
72-1086 72-1090
72-1091 72-1209
72-1244 72-1253
72-1264 72-1299
Toxicity/Humans
72-0673 72-0674
72-0755 72-0759
72-0792 72-0971
72-0980 72-0986
72-1127 72-1210
72-1216 72-1229
Toxicity/Wildlife
72-0717 72-0762
72-0909 72-0912
72-1164
Treatment of Poisoning
72-0986 72-1210

DDT derived compounds
see also Organochlorines
Analysis
72-0688 72-0702
72-0843 72-0844
72-0920 72-0972
72-1095
Biochemical Effects
72-0702 72-1276
Environmental Pollution
72-0929
Enzyme activity
72-0810 72-0813
72-1241 72-1242
72-1276
Metabolism
72-1015 72-1261
72-1311
Morbidity and Mortality Statistics
72-1195
Nervous System
72-1015
Reproduction/Growth
72-0810 72-0947
72-0972 72-1015
72-1173 72-1187
72-1261 72-1311
Residue Degradation
72-0702
Residue/Air
72-0688
Residues/Food and Feed
72-0698 72-0843
72-0844 72-0937
72-0943 72-1183
Residues/Humans
72-0689 72-0920
72-0946 72-1195
72-1202 72-1232
Residues/Plants
72-0920
Residues/Wildlife
72-0705 72-0712
72-0929 72-0947
72-0972 72-1173
72-1175 72-1184
72-1187
Toxicity/Experimental Animals
72-1015 72-1311
Toxicity/Humans
72-1232
Toxicity/Wildlife
72-0947 72-0972

DDT isomers
Analysis
72-0920 72-1095
Biochemical Effects
72-1053 72-1054
72-1065
Environmental Pollution
72-0929
Enzyme activity
72-1032 72-1065
72-1084
Excretory System
72-1032 72-1065
Metabolism
72-1011
Nervous System
72-1064
Residue Degradation
72-1011
Residues/Humans
72-0920 72-1202
Residues/Plants
72-0920
Residues/Wildlife
72-0929
Toxicity/Experimental Animals
72-1064

o,o'-DDT
see DDT isomers

o,p'-DDT
see DDT isomers

p,p'-DDT
see DDT

DDVP
see Dichlorvos

DEF
see also Organophosphate, Organophosphates
Biochemical Effects
72-0835
Blood/Body Fluids
72-0835
Digestive System
72-0723 72-0835
Enzyme activity
72-0723 72-0835
72-0968
Factors Influencing Metabolism/Toxicity
72-0835
Residue/Air
72-0968
Residues/Food and Feed
72-0835
Toxicity/Experimental Animals
72-0723 72-0835
Toxicity/Humans
72-0968

Delnav
Toxicity/Experimental Animals
72-1303

Demeton
see also Organophosphates
Respiratory System
72-0766
Sensory System
72-0766
Toxicity/Humans
72-0766

Desethyl chlorfenvinphos
see Chlorfenvinphos

Detox
Residues/Water
72-1178
Toxicity/Wildlife
72-1178

DFP
see also Organophosphates
Biochemical Effects
72-1286
Enzyme activity
72-0775 72-1031

72-1285 72-1286
72-1294
Nervous System
72-0775 72-1285
72-1286
Reproduction/Growth
72-1031
Sensory System
72-0730
Toxicity/Experimental
Animals
72-0775 72-1031
72-1285 72-1286
Toxicity/Humans
72-0730
Treatment of Poisoning
72-0775

Di-allate
see also Carbamates
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Toxicity/Experimental
Animals
72-1044

Diazinon
see also Organophosphates
Analysis
72-0733
Blood/Body Fluids
72-0728
Cardiovascular System
72-0728
Digestive System
72-0728 72-0733
Enzyme activity
72-0728 72-0733
72-0734
Integument
72-0728
Laws and Regulations
72-0669
Morbidity and Mortality
Statistics
72-0733
Nervous System
72-0733 72-1206
Prevention
72-0741
Reproduction/Growth
72-1209
Residues/Domestic
Animals
72-1209
Residues/Food and Feed
72-1209
Sensory System
72-1206
Toxicity/Domestic
Animals
72-1209
Toxicity/Experimental
Animals
72-1209
Toxicity/Humans
72-0728 72-0733
72-0734 72-0741
72-1206
Treatment of Poisoning
72-0728 72-0733
72-0734 72-0741

Diban
see also Carbamates
Biochemical Effects
72-1239
Nervous System
72-1239

Dibromochloropropane
see also Fumigants
Environmental Pollution
72-0751
Residues/Water
72-0751
Toxicity/Wildlife
72-0751

1,2-Dibromo-2,2-dichloroethyl dimethyl phosphate
see Naled

Dicamba
see also Herbicides
Laws and Regulations
72-0684

Dichlobenil
see also Herbicides
Analysis
72-0720
Photodecomposition
72-0720
Residue Degradation
72-0720
Residues/Water
72-0720 72-0936
72-1265
Toxicity/Experimental
Animals
72-1265

Dichloral urea
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Toxicity/Experimental
Animals
72-1044

Dichloran
see also Fungicides
Blood/Body Fluids
72-0798
Factors Influencing
Metabolism/Toxicity
72-0798
Sensory System
72-0730 72-0798
Toxicity/Experimental
Animals
72-0798
Toxicity/Humans
72-0730

4,4'-Dichlorobenzophenone
see Dicofol derived compounds

Dichlorodiphenylethanol
see also Organochlorines
Analysis
72-1097
Residue/Air
72-1097
Residues/Soil
72-1097
Residues/Water
72-1097

p,p'-Dichlorodiphenylmethane
see DDT derived compounds

Dichloronitrophenol
Biochemical Effects
72-0819
Toxicity/Experimental
Animals
72-0819

2,2-Dichlorovinyl methyl octyl phosphate
see also Organophosphates
Digestive System
72-1010
Enzyme activity
72-1010
Nervous System
72-1010
Toxicity/Experimental
Animals
72-1010

Dichlorprop
see also Herbicides
Analysis
72-0841 72-0842
72-1333

Dichlorvos
see also Organophosphates
Analysis
72-0921 72-1110
Biochemical effects
72-0828
Blood/Body Fluids
72-1304
Cardiovascular System
72-0828 72-1304
Digestive System
72-0828
Enzyme activity
72-0790 72-1304
Excretory System
72-0828

Factors Influencing Metabolism/Toxicity
72-0790 72-1299 72-1301 72-1304
Immunology
72-0991
Integument
72-0991
Nervous System
72-0828 72-1206
Reproduction/Growth
72-1209
Residues/Domestic Animals
72-1209
Residues/Food and Feed
72-0921 72-1209
Respiratory System
72-0828 72-1304
Sensory System
72-1206
Toxicity/Domestic Animals
72-0991 72-1209
Toxicity/Experimental Animals
72-0790 72-0828 72-1209 72-1299 72-1301 72-1304
Toxicity/Humans
72-1206

Dichlozoline
see also Fungicides
Analysis
72-0858

Dicofol
see also Organochlorines
Analysis
72-1339
Cytological Effects
72-0776
Enzyme activity
72-0813
Factors Influencing Metabolism/Toxicity
72-0776
Metabolism
72-0776
Prevention
72-1167
Residue Removal
72-1167
Residues/Food and Feed
72-1167 72-1339
Toxicity/Experimental Animals
72-0776

Dicofol derived compounds
Prevention
72-1167
Residue Removal
72-1167
Residues/Food and Feed
72-1167

Dicotex
see MCPA

Dicresyl
see also Carbamates
Biochemical Effects
72-0836
Blood/Body Fluids
72-0836
Digestive System
72-0836
Enzyme activity
72-0722
Excretory System
72-0836
Residues/Domestic Animals
72-0722
Residues/Food and Feed
72-0722
Respiratory System
72-0836
Toxicity/Experimental Animals
72-0836

Dicrotophos
see also Organophosphates
Enzyme activity
72-0790
Factors Influencing Metabolism/Toxicity
72-0781 72-0790 72-1301
Metabolism
72-0781
Reviews
72-0781
Toxicity/Experimental Animals
72-0790 72-1301
Toxicity/Wildlife
72-0781

Dieldrin
see also Organochlorines
Alternative Controls
72-1153
Analysis
72-0688 72-0708 72-0919 72-1319 72-1321 72-1331 72-1344
Biochemical Effects
72-1041
Blood/Body Fluids
72-1088
Carcinogenesis
72-0660
Cardiovascular System
72-1273
Cytological Effects
72-1344
Digestive System
72-0808
Education/Training
72-0660
Environmental Pollution
72-0697 72-0912 72-1156
Enzyme activity
72-0808 72-0810 72-0812 72-1241 72-1242
Excretory System
72-0808
Factors Influencing Metabolism/Toxicity
72-0781 72-0807 72-0808 72-1034 72-1052 72-1082 72-1088 72-1273
Laws and Regulations
72-0697 72-0902 72-1147 72-1153
Metabolism
72-0715 72-0781 72-0808 72-0812 72-1026 72-1034 72-1052 72-1055 72-1082 72-1088 72-1282
Mutagenesis/ Teratogenesis
72-0660
Nervous System
72-0808 72-0812 72-1041 72-1273
Photodecomposition
72-1191
Reproduction/Growth
72-0810 72-0947 72-1026 72-1083 72-1187 72-1188 72-1209 72-1247 72-1257 72-1344
Residue Degradation
72-0919 72-0954 72-1191
Residue Removal
72-0714 72-1172
Residue/Air
72-0688
Residues/Domestic Animals
72-1168 72-1209
Residues/Food and Feed
72-0697 72-0698 72-0703 72-0742 72-0919 72-0943 72-0954 72-1168 72-1174 72-1193 72-1198 72-1199 72-1209
Residues/Humans
72-0703 72-0946 72-1188 72-1198 72-1199 72-1202
Residues/Soil
72-0713 72-1186

Residues/Water
72-0703 72-0708
72-0713 72-0714
72-0715 72-1186
Residues/Wildlife
72-0703 72-0712
72-0947 72-1187
Respiratory System
72-0808
Reviews
72-0781 72-1153
72-1193
Toxicity/Domestic Animals
72-1209
Toxicity/Experimental Animals
72-0807 72-0808
72-0812 72-1034
72-1209 72-1247
72-1273
Toxicity/Humans
72-0742 72-1344
Toxicity/Wildlife
72-0781 72-0912
72-0947

2-Diethoxyphosphinylimino - 1,3 Dithiolane
see Cyolane

O,O-Diethyl S-(N-isopropyl carbamoylmethyl) phosphorothiolothionate
see Prothoate

O,O-Diethyl-O-(3-oxo-2-phenyl-2H-pyridazine-6-yl) phosphorothioate
see NC 250

Difolatan
see also Fungicides
Mutagenesis/Teratogenesis
72-0780
Toxicity/Experimental Animals
72-0780

3,5-Diisopropylphenyl N-methylcarbamate
see also Carbamates
Metabolism
72-0796
Reviews
72-0796

Dimefox
see also Organophosphates
Analysis
72-0850
as-liquid
72-0850

Dimetachlone
see also Fungicides
Analysis
72-0858

Dimethoate
see also Organophosphates
Analysis
72-1101
Biochemical Effects
72-0833 72-1084
Blood/Body Fluids
72-0833
Cardiovascular System
72-0833
Cytological Effects
72-1081
Digestive System
72-0833
Endocrine System
72-0833
Enzyme activity
72-0833
Factors Influencing Metabolism/Toxicity
72-0833
Metabolism
72-1081
Musculoskeletal System
72-0833
Nervous System
72-0833
Reproduction/Growth
72-0833
Residues/Food and Feed
72-0833
Toxicity/Experimental Animals
72-0833

4-dimethylamino-3,5-xylyl methylcarbamate
see Zectran

Dimethyldithiocarbomate
see Dibam

3,4-Dimethylphenyl N-methylcarbamate
see Carbamates

3,4,-Dimethylphenyl N-methyl carbamate
Analysis
72-0853

3,5-Dimethylphenyl N-methylcarbamate
see Carbamates

Dimetilan
see also Carbamates
Residue Degradation
72-0701

Dinitro-sec-butylphenol
see DNBP

Dinitrocresol
see DNOC

Dinitro-o-cresol
see DNOC

Dinitro-isopropylphenol
Biochemical Effects
72-0819
Toxicity/Experimental Animals
72-0819

Dinitrophenol
see also Nitro compounds
Biochemical Effects
72-0819
Toxicity/Experimental Animals
72-0819

2,4-Dinitrophenol
see also Fungicides, Nitro compounds
Reproduction/Growth
72-1248
Toxicity/Experimental Animals
72-1248

Dinobuton derived compounds
Metabolism
72-1045
Toxicity/Experimental Animals
72-1045

Dinobuton
see also Fungicides
Analysis
72-1340

Dinocap
see also Nitro compounds
Cardiovascular System
72-1218
Immunology
72-1218
Integument
72-1218
Residues/Humans
72-1218
Respiratory System
72-1218
Toxicity/Humans
72-1218
Treatment of Poisoning
72-1218

Dinoprop
Biochemical Effects
72-1302
Digestive System
72-1302
Toxicity/Experimental Animals
72-1302

Dinoseb
see also Herbicides
Biochemical Effects
72-1302
Digestive System
72-1302
Residues/Water
72-1178
Toxicity/Experimental Animals
72-1302

Toxicity/Wildlife
72-1178

Dioxathion
see Delnav

Dioxins
see also Polychlorinated biphenyls, 2,4,5-T
Analysis
72-0849 72-0959 72-1313
Biochemical Effects
72-1260
Digestive System
72-0787 72-1260
Environmental Pollution
72-0911 72-0959
Excretory System
72-0787
Factors Influencing Metabolism/Toxicity
72-0787
Laws and Regulations
72-1130
Lipids/steroids/sterols
72-1260
Metabolism
72-1262
Mutagenesis/Teratogenesis
72-0787 72-1130
Reproduction/Growth
72-0787
Toxicity/Experimental Animals
72-0787

2-(1,3-Dioxolane-2-yl)-phenyl-N-methylcarbamate
see also Carbamates
Analysis
72-0864

Diphenyl
see Biphenyl

Diplitox
Residues/Water
72-1178
Toxicity/Wildlife
72-1178

Diquat
see also Herbicides
Analysis
72-0720
Metabolism
72-1001
Photodecomposition
72-0720
Reproduction/Growth
72-1001
Residue Degradation
72-0720
Residues/Food and Feed
72-0696
Residues/Humans
72-0696
Residues/Water
72-0720
Sensory System
72-0730
Toxicity/Humans
72-0730

Dirax
see ANTU

Disulfoton
see also Organophosphates
Blood/Body Fluids
72-1073
Enzyme activity
72-1073
Toxicity/Humans
72-1073

Di-syston
see Disulfoton

Dithiocyanuric acid
see also Herbicides
Cytological Effects
72-1243
Digestive System
72-1243
Toxicity/Experimental Animals
72-1243

2,4-Dithio-6-methyl-s-triazine
see also Herbicides
Cytological Effects
72-1243
Digestive System
72-1243
Toxicity/Experimental Animals
72-1243

Ditox
see DDT
see Lindane

Diuron
see also Herbicides
Analysis
72-0877
Metabolism
72-1001
Photodecomposition
72-1171
Reproduction/Growth
72-1001
Residue Degradation
72-1171
Residue Removal
72-1171
Residues/Soil
72-0877
Residues/Water
72-1265
Toxicity/Experimental Animals
72-1265

DMPP
see Dinoprop

DNBP
see Dinobutn derived compounds
see Dinoseb
Biochemical Effects
72-0819
Toxicity/Experimental Animals
72-0819

DNOC
see also Nitro compounds
Analysis
72-0872
Biochemical Effects
72-0819
Cardiovascular System
72-1218
Factors Influencing Metabolism/Toxicity
72-1025
Immunology
72-1218
Integument
72-1218
Metabolism
72-1045
Prevention
72-1025
Reproduction/Growth
72-0824
Residues/Humans
72-1218
Residues/Water
72-0872
Respiratory System
72-1218
Toxicity/Experimental Animals
72-0819 72-1025 72-1045
Toxicity/Humans
72-1218
Treatment of Poisoning
72-1218

DNP
see Dinitrophenol

2,4-DP
see Dichlorprop

Duplitox
Residues/Water
72-1178
Toxicity/Wildlife
72-1178

Dyfonate
see also Organophosphates
Metabolism
72-1038
Residues/Soil
72-0690

Ekatox
Residues/Water
72-1178
Toxicity/Wildlife
72-1178

Endosulfan
see also Organochlorines
Analysis
72-1096
Excretory System
72-1289
Factors Influencing Metabolism/Toxicity
72-0807
Laws and Regulations
72-0672
Metabolism
72-1282
Mutagenesis/ Teratogenesis
72-1289
Photodecomposition
72-1191
Reproduction/Growth
72-1289
Residue Degradation
72-1191
Residues/Food and Feed
72-0672
Residues/Plants
72-1096
Toxicity/Experimental Animals
72-0807 72-1289

Endosulfan derived compounds
Analysis
72-1096
Residues/Plants
72-1096

Endrin
see also Organochlorines
Alternative Controls
72-1153
Analysis
72-1103 72-1344
Biochemical Effects
72-1041
Blood/Body Fluids
72-1088
Cardiovascular System
72-1273
Cytological Effects
72-1344
Environmental Pollution
72-0912
Factors Influencing Metabolism/Toxicity
72-1088 72-1273
Laws and Regulations
72-1147 72-1153
Metabolism
72-1088 72-1282
Nervous System
72-1041 72-1273
Prevention
72-0975
Reproduction/Growth
72-1042 72-1344
Residue Degradation
72-0954
Residue Removal
72-0938
Residues/Food and Feed
72-0742 72-0943
72-0954 72-0975
72-1198
Residues/Humans
72-1198
Residues/Soil
72-0690 72-0713
Residues/Water
72-0713 72-0938
Reviews
72-1153
Toxicity/Experimental Animals
72-1042 72-1273
Toxicity/Humans
72-0742 72-0975
72-1344
Toxicity/Wildlife
72-0912

EPN
see also Herbicides
Enzyme activity
72-0792
Residues/Humans
72-1212
Sensory System
72-1212
Toxicity/Experimental Animals
72-0792
Toxicity/Humans
72-0792 72-1212
Treatment of Poisoning
72-1212

Eptam
see EPTC

EPTC
see also Carbamates
Analysis
72-0869
Blood/Body Fluids
72-0818
Endocrine System
72-0818
Residues/Food and Feed
72-0869
Toxicity/Experimental Animals
72-0818

Estox
see also Organophosphates
Residues/Food and Feed
72-0961

Ethylene dibromide
see also Fumigants
Biochemical Effects
72-1293
Metabolism
72-1293
Toxicity/Experimental Animals
72-1293

Ethylene oxide
see also Fumigants
Residues/Food and Feed
72-0696
Residues/Humans
72-0696

Ethyl-parathion
see Parathion

E 605
see Parathion

Famfur
see Famphur

Famphur
see also Herbicides
Toxicity/Experimental Animals
72-1303

Fenitrothion
see also Organophosphates
Analysis
72-0865 72-0878
72-0885
Enzyme activity
72-0792
Factors Influencing Metabolism/Toxicity
72-1299
Nervous System
72-1206
Residue Removal
72-0963
Residues/Food and Feed
72-0961
Residues/Humans
72-1192
Residues/Water
72-0885
Sensory System
72-1206 72-1207
Toxicity/Experimental Animals
72-0792 72-1207
72-1237 72-1299
Toxicity/Humans
72-0792 72-1192
72-1206 72-1207

Fenthion
see also Organophosphates
Blood/Body Fluids
72-1229
Immunology
72-1229
Residues/Food and Feed
72-0961
Toxicity/Humans
72-1229

Fentin acetate
see also Fungicides
Analysis
72-1327
Ferbam
see also Fungicides
Analysis
72-1327
Fluometuron
see also Herbicides
Metabolism
72-1001
Reproduction/Growth
72-1001
Fluor chrome arsenate phenol
see also Arsenicals
Cardiovascular System
72-0736
Digestive System
72-0736
Factors Influencing Metabolism/Toxicity
72-0736
Nervous System
72-0736
Toxicity/Domestic Animals
72-0736
Folithion
see Fenitrothion
Folpet
see also Fungicides
Mutagenesis/ Teratogenesis
72-0780
Toxicity/Experimental Animals
72-0780
Formaldehyde
see also Fumigants
Reproduction/Growth
72-1283
Formothion
see also Organophosphates
Biochemical Effects
72-1277
Blood/Body Fluids
72-1277
Digestive System
72-1277
Enzyme activity
72-1277
Nervous System
72-1277
Toxicity/Experimental Animals
72-1277
Formparanate
Residue Degradation
72-0717
Residues/Plants
72-0717
Residues/Water
72-0717
Residues/Wildlife
72-0717
Toxicity/Wildlife
72-0717
Fumigants
see also Allyl alcohol, Calcium cyanide, Dazomet, Dibromochloropropane, Ethylene dibromide, Ethylene oxide, Formaldehyde, Hydrogen cyanide, Metham, Methyl bromide, Phosphine, Sulfur dioxide
Biochemical Effects
72-1081
Cytological Effects
72-1081
Metabolism
72-1081
Fungicides
see also Benomyl, Biphenyl, Captan, Conen, Copper oxychloride, Dichloran, Dichlozoline, Difolatan, Dimetachlone, 2,4-Dinitrophenol, Dinobuton, Fentin acetate , Ferbam, Folpet, Hexachlorobenzene, Mancozeb, Maneb, Mercurials, Thiabendazole , Thiram, Tin compounds, Triphenyltin, Zineb, Ziram
Alternative Controls
72-1152
Analysis
72-1317
Biochemical Effects
72-1081
Cytological Effects
72-1081
Endocrine System
72-1258
Environmental Pollution
72-1152
Experimental Design
72-1152
Laws and Regulations
72-0668
Metabolism
72-1081
Nervous System
72-1233
Residues/Water
72-1152
Toxicity/Experimental Animals
72-1258
Toxicity/Humans
72-1233
Furadan
see Carbofuran
Furamethrin
see also Botanicals
Analysis
72-1345
Gardona
see also Organophosphates
Toxicity/Experimental Animals
72-1244
Gramoxone
see Paraquat
Granosan
see also Mercurials
Analysis
72-0884
Digestive System
72-0976 72-1020
Endocrine System
72-1020
Musculoskeletal System
72-1020
Nervous System
72-0770 72-0976
Reproduction/Growth
72-1020
Residue Degradation
72-0724
Residues/Domestic Animals
72-0724 72-0770
Residues/Food and Feed
72-0724 72-0770 72-0884
Toxicity/Domestic Animals
72-0770 72-0976
Toxicity/Experimental Animals
72-0724 72-1020
GS-14254
see also Herbicides
Metabolism
72-1006
Gusathion
see Azinphosmethyl
Guthion
see Azinphosmethyl
HCB
see Hexachlorobenzene
Heklotox
Residues/Water
72-1178
Toxicity/Wildlife
72-1178
HEOD
see Dieldrin
Heptachlor
see also Organochlorines
Alternative Controls
72-1153

Analysis
72-1103 72-1319
72-1321
Associations/
Organizations
72-0905
Enzyme activity
72-0812 72-1087
Factors Influencing
Metabolism/Toxicity
72-0807 72-1087
Laws and Regulations
72-0905 72-1153
Metabolism
72-0812 72-1057
Nervous System
72-0812
Residue Degradation
72-0954
Residues/Food and Feed
72-0943 72-0954
72-1174 72-1193
Reviews
72-1153 72-1193
Sensory System
72-0730
Toxicity/Experimental
Animals
72-0807 72-0812
72-1087
Toxicity/Humans
72-0730 72-0905

Heptachlor derived compounds
Residues/Food and Feed
72-0956
Residues/Humans
72-0956
Residues/Soil
72-0956
Residues/Wildlife
72-0956

Heptachlor epoxide
see also Organochlorines
Analysis
72-0708 72-1118
72-1319 72-1321
72-1329
Metabolism
72-0715
Reproduction/Growth
72-0947 72-1187
72-1209
Residues/Domestic
Animals
72-1209
Residues/Food and Feed
72-0943 72-1209
Residues/Humans
72-0946 72-1202
Residues/Soil
72-1118
Residues/Water
72-0708 72-0715
Residues/Wildlife
72-0712 72-0947
72-1187
Toxicity/Domestic
Animals
72-1209
Toxicity/Experimental
Animals
72-1209
Toxicity/Wildlife
72-0947

Herbicides
see also Acrofol, Amitrole, Arsenicals, Atrazine, Barban, Butylate, Carbamates, Carbetamide, Chlorbromuron, Chlordane, Chlormequat Chloride, 3-Chloropropionic acid, Chlorpropham, Dacthal, Dalapon, 2,4-DB, 2,4-derived compounds, Dicamba, Dichlobenil, Dichlorprop, Dinoseb, Diquat, Dithiocyanuric acid, 2,4-Dithio-6-methyl-s-triazine, Diuron, 2,4-D, EPN, Famphur, Fluometuron, GS-14254, Ioxynil, Linuron, MCPA, MCPP, Metobromuron, Monolinuron, Monothiocyanuvic acid, Monuron, Morfamquat, Nitralin, Paraquat, PCP, Pebulate, Picloram, Prometryne, Propham, Pyrazon, SD 15418, Silvex, Simazine, Sodium chlorate, Sodium ethylxanthogenate, TCA, Thiabendazole, Triallate, Trifluralin, Trithiocyanuric acid, 2,4,5-T
Cyanuric acid
72-1017
Alternative Controls
72-1152
Analysis
72-0721 72-0880
72-1317 72-1353
Beneficial Effects
72-0662
Environmental Pollution
72-0662 72-0899
72-1152 72-1182
Experimental Design
72-0721 72-1152
Laws and Regulations
72-1163
Residue Degradation
72-1163
Residues/Food and Feed
72-0934
Residues/Soil
72-0934
Residues/Water
72-0721 72-1152
72-1163 72-1182
Reviews
72-0662 72-0889

Hexa
see also Repellants
Environmental Pollution
72-1182 72-1135
Residues/Water
72-1182

Hexachlorane
see BHC

Hexachlorobenzene
see also Fungicides
Biochemical Effects
72-1037 72-1263
Digestive System
72-1263
Factors Influencing
Metabolism/Toxicity
72-1037
Prevention
72-0975
Residues/Food and Feed
72-0930 72-0975
Reviews
72-1263
Toxicity/Experimental
Animals
72-1037
Toxicity/Humans
72-0975

Hexachlorobutadiene
see also Organochlorines
Biochemical Effects
72-0820
Blood/Body Fluids
72-0820
Enzyme activity
72-0820
Immunology
72-0820
Prevention
72-0820
Toxicity/Experimental
Animals
72-0820

Hexachlorocyclohexane
see BHC Isomers

gamma-Hexachlorocyclohexane
see Lindane

Hinosan
see also Organophosphates
Residues/Food and Feed
72-0961

HRS-1422
see 3,5-Diisopropylphenyl N-methylcarbamate

Hydrocyanic acid
see Hydrogen cyanide
Hydrogen cyanide
see also Fumigants
Prevention
72-1180
Residues/Food and Feed
72-1180
Respiratory System
72-0767 72-0769
Reviews
72-1180
Toxicity/Experimental Animals
72-1180
Toxicity/Humans
72-0767 72-0769 72-1180
Treatment of Poisoning
72-0767 72-0769
1-Hydroxychlordene
see Heptachlor derived compounds
Ialan
see EPTC
Imidan
see also Organophosphates
Analysis
72-0886
Residues/Food and Feed
72-0886

Inezin
see also Organophosphates
Residues/Food and Feed
72-0961
Intration
see Thiometon
Ioxynil
see also Herbicides
Metabolism
72-1001
Reproduction/Growth
72-1001
IPC
see also Carbamates
Laws and Regulations
72-1147
Metabolism
72-1021
Toxicity/Experimental Animals
72-1021

Isolan
see also Carbamates
Factors Influencing Metabolism/Toxicity
72-0781
Metabolism
72-0781
Reviews
72-0781
Toxicity/Wildlife
72-0781

Isopropyl-N-(3-chlorophenyl)carbamate
see Chloro-IPC
Isopropyl N-(3-chlorophenyl)carbamate
see Chlorpropham
Isopropylmethyl phosphonofluoridate
see Sarin
Isopropyl-N phenylcarbamate
see IPC
Isopropyl-N-phenylcarbamate
see IPC
3-Isopropylphenyl N-methylcarbamate
see also Carbamates
Metabolism
72-0796
Reviews
72-0796
Kanechlor
see Polychlorinated biphenyls
Karathane
see Dinocap
Kelthane
see Dicofol
Kepone
see Chlordecon
Kitazin-P
see also Organophosphates
Residues/Food and Feed
72-0961
Kreozan
Morbidity and Mortality Statistics
72-0988
Toxicity/Humans
72-0988
Landrin
see also Carbamates
Metabolism
72-0796
Reviews
72-0796

Lead
Conferences
72-0910
Environmental Pollution
72-0910
Nervous System
72-1233
Residue Removal
72-0963
Residues/Food and Feed
72-0962 72-1198
Residues/Humans
72-0910 72-1198
Residues/Wildlife
72-0935
Toxicity/Humans
72-1233

Lebaycid
see Fenthion
Lignisan
see also Mercurials
Metabolism
72-1040
Lindane
see also Organochlorines, Organophosphates
Analysis
72-0688 72-0708 72-0843 72-0920 72-1103 72-1120 72-1296 72-1319 72-1321
Associations/Organizations
72-0905
Biochemical Effects
72-0786 72-0834
Blood/Body Fluids
72-0759 72-0793 72-1229 72-1296
Carcinogenesis
72-1300
Digestive System
72-0793 72-1216
Endocrine System
72-0793
Environmental Pollution
72-0693
Enzyme activity
72-0785 72-0786 72-0812 72-1241 72-1242
Excretory System
72-0793 72-1296
Factors Influencing Metabolism/Toxicity
72-0785 72-0786 72-0807
Immunology
72-0759 72-1216 72-1229
Laws and Regulations
72-0669 72-0672 72-0905 72-1147
Metabolism
72-0715 72-0812 72-0834 72-0918 72-1296 72-1300
Musculoskeletal System
72-0834
Nervous System
72-0793 72-0812 72-1216 72-1296
Prevention
72-0986
Reproduction/Growth
72-0793 72-0827 72-1042 72-1188 72-1209

Residue Degradation
72-0692 72-0694
72-0834 72-0918
72-0954
Residue Dynamics
72-0694
Residue Removal
72-1172
Residue/Air
72-0688 72-0692
72-1296
Residues/Domestic Animals
72-0694 72-1209
Residues/Food and Feed
72-0672 72-0693
72-0694 72-0703
72-0843 72-0923
72-0943 72-0954
72-0962 72-1197
72-1198 72-1209
Residues/Humans
72-0694 72-0703
72-0920 72-0946
72-1188 72-1197
72-1198 72-1202
72-1216
Residues/Plants
72-0920 72-1201
Residues/Soil
72-0692 72-0693
72-0713
Residues/Water
72-0692 72-0703
72-0708 72-0713
72-0715
Residues/Wildlife
72-0694 72-0703
Respiratory System
72-0834 72-1296
Toxicity/Domestic Animals
72-1209
Toxicity/Experimental Animals
72-0785 72-0786
72-0793 72-0807
72-0812 72-0827
72-0834 72-1042
72-1209 72-1300
Toxicity/Humans
72-0759 72-0905
72-0986 72-1216
72-1229
Treatment of Poisoning
72-0986

Linuron
see also Herbicides
Analysis
72-0863
Metabolism
72-1305

Magnesium chlorate-chloride
Analysis
72-1100
Residue/Air
72-1100

Malathion
see also Organophosphates
Analysis
72-0847 72-1196
72-1332
Associations/ Organizations
72-0905
Enzyme activity
72-0735 72-0792
Factors Influencing Metabolism/Toxicity
72-1299
Laws and Regulations
72-0905
Nervous System
72-1049
Prevention
72-0741
Residues/Food and Feed
72-0924 72-0925
72-0961 72-1196
Residues/Humans
72-1192
Residues/Wildlife
72-0847
Reviews
72-1332
Sensory System
72-1207
Toxicity/Experimental Animals
72-0792 72-1049
72-1207 72-1299
Toxicity/Humans
72-0741 72-0792
72-0905 72-1192
72-1207
Toxicity/Wildlife
72-0735
Treatment of Poisoning
72-0741

Mancozeb
see also Fungicides
Digestive System
72-1023
Endocrine System
72-1023
Enzyme activity
72-1023
Excretory System
72-1023
Mutagenesis/ Teratogenesis
72-1023
Nervous System
72-1023
Reproduction/Growth
72-1023
Respiratory System
72-1023
Toxicity/Experimental Animals
72-1023

Maneb
see also Fungicides
Analysis
72-1327
Biochemical effects
72-0822
Biochemical Effects
72-0830
Blood/Body Fluids
72-0753 72-0830
Cardiovascular System
72-0822
Digestive System
72-0822 72-1023
Endocrine System
72-0822 72-0830
72-0831 72-1023
Enzyme activity
72-0753 72-0822
72-1023
Excretory System
72-1023
Mutagenesis/ Teratogenesis
72-1023
Nervous System
72-0822 72-1023
Reproduction/Growth
72-0831 72-1023
Residue/Air
72-0753
Respiratory System
72-0822 72-1023
Toxicity/Experimental Animals
72-0822 72-0830
72-0831 72-1023
Toxicity/Humans
72-0753

Matacil
see Aminocarb

MCPA
see also Herbicides
Analysis
72-0841
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Laws and Regulations
72-0681 72-1159
Toxicity/Experimental Animals
72-1044

MCPP
see also Herbicides

Analysis
72-0842

Menazon
see also Organophosphates
Analysis
72-0873 72-1099
Residue/Air
72-1099
Residues/Water
72-0873

Mercaptophos
see Demeton

Mercuran
see also Mercurials
Digestive System
72-1020
Endocrine System
72-1020
Musculoskeletal System
72-1020
Reproduction/Growth
72-1020
Toxicity/Experimental Animals
72-1020

Mercurhexane
see also Mercurials
Digestive System
72-1020
Endocrine System
72-1020
Musculoskeletal System
72-1020
Reproduction/Growth
72-1020
Toxicity/Experimental Animals
72-1020

Mercurials
see also Fungicides, Granosan, Lignisan, Mercuran, Mercurhexane, Phenylmercuric bromide, PMA
Alternative Controls
72-1152
Analysis
72-0861 72-0884
72-1121
Biochemical Effects
72-0861 72-1000
Blood/Body Fluids
72-0719 72-1000
Cardiovascular System
72-1000
Environmental Pollution
72-0673 72-0691
72-0704 72-0890
72-0891 72-0906
72-0911 72-1129
72-1141 72-1152
72-1200
Excretory System
72-1000
Experimental Design
72-1121 72-1152
Factors Influencing Metabolism/Toxicity
72-1075
Laws and Regulations
72-0673 72-0684
72-0685 72-0700
72-0704 72-0719
72-0890 72-0902
72-1129
Metabolism
72-0704 72-1075
72-1306
Nomenclature
72-0685
Prevention
72-0700
Reproduction/Growth
72-0719
Residue Dynamics
72-0718
Residues/Food and Feed
72-0673 72-0691
72-0704 72-0710
72-0719 72-0884
72-1000
Residues/Humans
72-0673 72-0704
72-0710 72-0906
Residues/Soil
72-0704 72-0922
Residues/Water
72-0691 72-0700
72-0718 72-0719
72-0890 72-1152
72-1200
Residues/Wildlife
72-0695 72-0700
72-0710 72-0718
72-0719 72-1200
Reviews
72-0719 72-0906
72-0922
Toxicity/Humans
72-0673 72-0695
72-1000
Toxicity/Wildlife
72-0695
Treatment of Poisoning
72-1000

Mesurol
see Methiocarb

Metathion
see Fenitrothion

Metham
see also Fumigants
Reproduction/Growth
72-1283

Methiocarb
see also Carbamates
Laws and Regulations
72-0678
Metabolism
72-0796 72-1254
Reviews
72-0796

Methomyl
see also Carbamates
Laws and Regulations
72-0678

Methoxychlor
see also Organochlorines
Analysis
72-0708
Digestive System
72-0808
Enzyme activity
72-0808
Excretory System
72-0808
Factors Influencing Metabolism/Toxicity
72-0808
Metabolism
72-0808
Nervous System
72-0808
Reproduction/Growth
72-1209
Residues/Domestic Animals
72-1209
Residues/Food and Feed
72-1209
Residues/Water
72-0708
Respiratory System
72-0808
Toxicity/Domestic Animals
72-1209
Toxicity/Experimental Animals
72-0808 72-1018
72-1209
Toxicity/Wildlife
72-1018

2-Methoxy-4-ethylamino-6-sec-butylamino-s-triazine
see GS-14254

Methyl bromide
see also Fumigants
Biochemical Effects
72-0821
Prevention
72-1179
Residues/Food and Feed
72-1179 72-1185
Reviews
72-1179

Toxicity/Experimental Animals
72-0821 72-1179
Toxicity/Humans
72-1179
Treatment of Poisoning
72-0821
Methyl demeton
see also Organophosphates
Morbidity and Mortality Statistics
72-0974
Prevention
72-0741
Respiratory System
72-0766
Sensory System
72-0766
Toxicity/Humans
72-0741 72-0766 72-0974
Treatment of Poisoning
72-0741 72-0974
Methyl Mercaptophos
see also Organophosphates
Enzyme activity
72-0968
Immunology
72-1019
Residue/Air
72-0968 72-1203
Toxicity/Humans
72-0968
Methyl mercury
see Mercurials
2-Methyl-1-naphthyl N-methyl carbamate
Cardiovascular System
72-0837
Digestive System
72-0837
Endocrine System
72-0837
Enzyme activity
72-0837
Nervous System
72-0837
Respiratory System
72-0837
Toxicity/Experimental Animals
72-0837
Methyl nitrophos
see Fenitrothion
Methyl parathion
see also Organophosphates
Cardiovascular System
72-0979
Toxicity/Humans
72-0979

3-Methylphenyl N-methylcarbamate
see Carbamates
2-methyl-5-(2-propynyl)-furylmethyl-2,2-dimethyl-8-(2-methyl-1-propenyl)-cy
see Proparthrin
Methylsystox
see Methyl demeton
Metmercapturon
see Methiocarb
Metobromuron
see also Herbicides
Analysis
72-0863
Mevinphos
see also Organophosphates
Blood/Body Fluids
72-1073
Enzyme activity
72-0790 72-1073
Factors Influencing Metabolism/Toxicity
72-0790 72-1301
Toxicity/Experimental Animals
72-0790 72-1301
Toxicity/Humans
72-1073
Milbex
see CPAS
see Dichlorodiphenylethanol
Mirex
see also Organochlorines
Beneficial Effects
72-1136
Laws and Regulations
72-0902 72-1136
Mitotane
see TDE
Mobam
see also Carbamates
Metabolism
72-0796
Residue Degradation
72-0717
Residues/Plants
72-0717
Residues/Water
72-0717
Residues/Wildlife
72-0717
Reviews
72-0796
Toxicity/Wildlife
72-0717
Monocrotophos
see also Organophosphates
Enzyme activity
72-0790
Factors Influencing Metabolism/Toxicity
72-0781 72-0790 72-1301
Metabolism
72-0781
Reviews
72-0781
Toxicity/Experimental Animals
72-0790 72-1301
Toxicity/Wildlife
72-0781
Monolinuron
see also Herbicides
Analysis
72-0863
Monothiocyanuric acid
see also Herbicides
Cytological Effects
72-1243
Digestive System
72-1243
Toxicity/Experimental Animals
72-1243
Monuron
see also Herbicides
Carcinogenesis
72-0805 72-1043
Cytological Effects
72-0805 72-1043
Digestive System
72-0805 72-1043
Enzyme activity
72-1043
Respiratory System
72-0805
Toxicity/Experimental Animals
72-0805
Morfamquat
see also Herbicides
Residues/Food and Feed
72-0696
Residues/Humans
72-0696
MPA
Photodecomposition
72-0706
MPMC
see 3,4,-Dimethylphenyl N-methyl carbamate
MTMC
see also Carbamates
Analysis
72-0852 72-0853
Mylone
see Dazomet
Naled
see also Organophosphates
Toxicity/Wildlife
72-0966
alpha-Naphthol
see Carbaryl derived compounds
alpha-Naphthyl isothiocyanate
Biochemical Effects
72-1013

Blood/Body Fluids
72-1013
Digestive System
72-1013
Enzyme activity
72-1013
Toxicity/Domestic Animals
72-1013
Naphthyl thiourea
see ANTU
NC 250
see also Organophosphates
Blood/Body Fluids
72-1297
Digestive System
72-1298
Enzyme activity
72-1297
Excretory System
72-1298
Nervous System
72-1297
Reproduction/Growth
72-1298
Respiratory System
72-1298
Toxicity/Experimental Animals
72-1297 72-1298
Nemagon
see Dibromochloropropane
Nicotine
see also Botanicals
Laws and Regulations
72-0679
Nicotine sulfate
see also Botanicals
Laws and Regulations
72-0679
Nitralin
see also Herbicides
Metabolism
72-1001
Reproduction/Growth
72-1001
Nitro compounds
see also Binapacryl, Dinitrophenol, 2,4-Dinitrophenol, Dinocap, DNOC, PCNB, TFM
Blood/Body Fluids
72-0971
Factors Influencing Metabolism/Toxicity
72-0987
Prevention
72-0987
Toxicity/Humans
72-0971 72-0987
Toxicity/Wildlife
72-1004
Nitrostigmin
see Parathion
NOBD
see n-Octyl bicycloheptene dicarboximide
Nuvan
see Dichlorvos
Octachlorodibenzo-p-dioxin
see Dioxins
n-Octyl bicycloheptene dicarboximide
see also Synergists
Analysis
72-1343
OMPA
see Schradan
Organochlorines
see also Aldrin, BHC, BHC isomers, Chlordane, gamma-Chlordane, Chlordecon, CPAS, DDT, DDT derived compounds, Dichlorodiphenylethanol, Dicofol, Dieldrin, Endosulfan, Endrin, Heptachlor, Heptachlor epoxide, Hexachlorobutadiene, Lindane, Methoxychlor, Mirex, Ovex, Polychlorinated biphenyls, Polychloropinene, TDE, Toxaphene, Trichloropropionitrile
Alternative Controls
72-0663 72-0982
72-1152
Analysis
72-0846 72-0847
72-0848 72-0867
72-0876 72-0879
72-0881 72-1105
72-1121 72-1316
72-1349
Blood/Body Fluids
72-1226
Conferences
72-1133
Digestive System
72-0754 72-0967
Environmental Pollution
72-0663 72-0691
72-0707 72-0906
72-0909 72-0911
72-1133 72-1152
72-1154 72-1182
Enzyme activity
72-0995 72-1226
Experimental Design
72-0707 72-1121
72-1152
Factors Influencing Metabolism/Toxicity
72-0987
Immunology
72-0967
Laws and Regulations
72-0668 72-0700
72-0903
Morbidity and Mortality Statistics
72-0965
Nervous System
72-0967
Prevention
72-0700 72-0745
72-0981 72-0982
72-0987
Reproduction/Growth
72-0947
Residue Degradation
72-0953
Residue/Food and Feed
72-0711
Residues/Food and Feed
72-0691 72-0933
72-0934 72-0953
Residues/Humans
72-0707 72-0906
72-1226
Residues/Soil
72-0933 72-0934
Residues/Water
72-0691 72-0700
72-0909 72-0948
72-1152 72-1182
Residues/Wildlife
72-0700 72-0847
72-0909 72-0947
72-0948
Reviews
72-0876 72-0906
72-0948 72-0981
72-0982 72-0992
Toxicity/Domestic Animals
72-0992
Toxicity/Humans
72-0740 72-0754
72-0965 72-0967
72-0987 72-0995
72-1226
Toxicity/Wildlife
72-0758 72-0909
72-0947 72-0948
72-0981 72-0982
72-1004 72-1225
Treatment of Poisoning
72-0754 72-0992
Organophosphates
see also Abate, Azinphosmethyl, Bromophos, Carbophenothion, Chlorfenvinphos, Chlorphenvinphos, Conen, Crotoxyphos, Cyanox, Cyolane, Cythioate, DEF, Demeton, DFP, Diazinon, 2,

2-Dichlorovinyl methyl octyl phosphate, Dichlorvos, Dicrotophos, Dimefox, Dimethoate, Disulfoton, Dyfonate, Estox, Fenitrothion, Fenthion, Formothion, Gardona, Hinosan, Imidan, Inezin, Kitazin-P, Lindane, Malathion, Menazon, Methyl demeton, Methyl Mercaptophos, Methyl parathion, Mevinphos, Monocrotophos, Naled, NC 250, Oxydemeton methyl, Paraoxon, Parathion, Phenthoate, Phosalone, Phosphamidon, PP 211, Prothoate, Ronnel , Sarin, Schradan, Soman, Surecide, TEPP, Tetram, Thiometon, Triamiphos, Trichlorfon
Alternative Controls
72-0663 72-0982
Analysis
72-0795 72-0860
72-0868 72-0876
72-1104 72-1108
72-1110 72-1119
72-1121 72-1335
72-1342 72-1352
Biochemical Effects
72-0888 72-1217
Blood/Body Fluids
72-1226
Carcinogenesis
72-0761
Digestive System
72-0754 72-0773
72-0967
Environmental Pollution
72-0663 72-0691
72-1182
Enzyme activity
72-0773 72-0795
72-0888 72-0995
72-1009 72-1210
72-1217 72-1221
72-1226 72-1266
72-1272 72-1290
Experimental Design
72-1121
Factors Influencing Metabolism/Toxicity
72-0739 72-0888
72-0987 72-1272
Immunology
72-0967
Laws and Regulations
72-0668
Metabolism
72-1266 72-1280
Musculoskeletal System
72-0773
Nervous System
72-0773 72-0967
72-1009 72-1210
72-1217 72-1266
Nomenclature
72-1281
Prevention
72-0745 72-0981
72-0982 72-0987
Reproduction/Growth
72-1188
Residue Degradation
72-0953
Residue/Food and Feed
72-0711
Residues/Food and Feed
72-0691 72-0868
72-0934 72-0953
72-1104
Residues/Humans
72-0773 72-1188
72-1226
Residues/Plants
72-0868
Residues/Soil
72-0868 72-0934
Residues/Water
72-0691 72-1182
Respiratory System
72-1217
Reviews
72-0795 72-0876
72-0981 72-0982
72-0992 72-1009
72-1221 72-1266
72-1281
Sensory System
72-0773
Toxicity/Domestic Animals
72-0992
Toxicity/Experimental Animals
72-1266 72-1280
72-1281
Toxicity/Humans
72-0739 72-0740
72-0754 72-0773
72-0967 72-0987
72-0995 72-1210
72-1217 72-1221
72-1226 72-1281
Toxicity/Wildlife
72-0966 72-0981
72-0982 72-1004
72-1225
Treatment of Poisoning
72-0739 72-0754
72-0773 72-0992
72-1009 72-1210
72-1217 72-1266
Osmose
see Fluor chrome arsenate phenol
Ovex
see also Organochlorines
Cytological Effects
72-0809
Digestive System
72-0809
Enzyme activity
72-0809
Toxicity/Experimental Animals
72-0809
Oxychlordane
see Chlordane
see Chlordane derived compounds
Oxydemeton methyl
see also Organophosphates
Biochemical Effects
72-0835
Blood/Body Fluids
72-0835
Digestive System
72-0835
Enzyme activity
72-0835
Factors Influencing Metabolism/Toxicity
72-0835
Residues/Food and Feed
72-0835
Toxicity/Experimental Animals
72-0835
Paraoxon
see also Organophosphates
Endocrine System
72-1092
Enzyme activity
72-0790 72-1092
72-1270
Factors Influencing Metabolism/Toxicity
72-0790 72-1301
Nervous System
72-0806
Reproduction/Growth
72-1092
Sensory System
72-0730
Toxicity/Experimental Animals
72-0790 72-0806
72-1301
Toxicity/Humans
72-0730
Treatment of Poisoning
72-0806
Paraquat
see also Herbicides
Analysis
72-1224

Cardiovascular System
72-1223
Digestive System
72-1222 72-1223
Excretory System
72-1222 72-1223
Integument
72-0729
Metabolism
72-1001
Prevention
72-0729
Reproduction/Growth
72-1001
Residues/Soil
72-1190
Residues/Water
72-1265
Respiratory System
72-1222 72-1223
Sensory System
72-0730
Toxicity/Experimental Animals
72-1265
Toxicity/Humans
72-0729 72-0730
72-1222 72-1223
72-1224
Treatment of Poisoning
72-1224

Parathion
see also Organophosphates
Analysis
72-0847 72-0880
72-1107 72-1196
Biochemical Effects
72-0789 72-1081
Blood/Body Fluids
72-0728
Cardiovascular System
72-0728
Cytological Effects
72-1081
Digestive System
72-0728 72-0789
72-1205
Endocrine System
72-0789
Environmental Pollution
72-0673 72-0697
Enzyme activity
72-0728 72-0790
72-1062 72-1074
72-1205 72-1231
Factors Influencing Metabolism/Toxicity
72-0790 72-1274
72-1299 72-1301
Integument
72-0728 72-1307
Laws and Regulations
72-0672 72-0673
72-0697
Metabolism
72-1066 72-1074
72-1081 72-1274
72-1275
Morbidity and Mortality Statistics
72-1219
Musculoskeletal System
72-1231
Nervous System
72-1074 72-1205
Prevention
72-0741
Reproduction/Growth
72-0789 72-1062
Residues/Food and Feed
72-0672 72-0673
72-0696 72-0697
72-0961 72-1196
72-1198
Residues/Humans
72-0673 72-0696
72-1192 72-1198
72-1208 72-1212
Residues/Wildlife
72-0847
Respiratory System
72-1205 72-1219
Reviews
72-1205
Sensory System
72-0730 72-1212
Toxicity/Experimental Animals
72-0789 72-0790
72-1062 72-1074
72-1274 72-1299
72-1301 72-1307
Toxicity/Humans
72-0673 72-0728
72-0730 72-0741
72-1192 72-1205
72-1208 72-1212
72-1219
Treatment of Poisoning
72-0728 72-0741
72-1205 72-1212
72-1219

PCB
see Polychlorinated biphenyls

PCNB
see also Nitro compounds
Residues/Food and Feed
72-0930

PCP
see also Herbicides
Biochemical Effects
72-0799
Cytological Effects
72-0799
Digestive System
72-0799
Enzyme activity
72-0799
Factors Influencing Metabolism/Toxicity
72-1299
Metabolism
72-1001
Reproduction/Growth
72-1001
Residue Degradation
72-0727
Toxicity/Experimental Animals
72-0799 72-1299

PCP derived compounds
Biochemical Effects
72-0799
Cytological Effects
72-0799
Digestive System
72-0799
Enzyme activity
72-0799
Toxicity/Experimental Animals
72-0799

Pebulate
see also Herbicides
Analysis
72-0869
Residues/Food and Feed
72-0869

Pentachloronitrobenzene
see PCNB

Petroleum oils
Alternative Controls
72-1138
Prevention
72-1138

Phenthoate
see also Organophosphates
Residue Removal
72-0963

D(-) phenylcarbamoyloxy-2-(N-ethylpropionamide
see Carbetamide

Phenylmercuric acetate
see PMA

Phenylmercuric bromide
see also Mercurials
Digestive System
72-1020
Endocrine System
72-1020
Musculoskeletal System
72-1020
Reproduction/Growth
72-1020
Toxicity/Experimental Animals
72-1020

Phosalone
see also Organophosphates
Residues/Food and Feed
72-0949

Phosdrin
see Mevinphos
Phosphamide
see Dimethoate
Phosphamidon
see also Organophosphates
Prevention
72-0741
Toxicity/Humans
72-0741
Treatment of Poisoning
72-0741
Phosphine
see also Fumigants
Prevention
72-0957 72-1179
Residues/Food and Feed
72-0696 72-0957
72-0958 72-1179
Residues/Humans
72-0696
Reviews
72-1179
Toxicity/Experimental Animals
72-1179
Toxicity/Humans
72-1179
Phthalophos
see Imidan
Phthalthrin
see Pyrethrins
Picloram
see also Herbicides
Beneficial Effects
72-0682
Cardiovascular System
72-0826
Endocrine System
72-0826
Integument
72-0826
Laws and Regulations
72-0682 72-0684
Metabolism
72-1001
Prevention
72-0682
Reproduction/Growth
72-1001
Sensory System
72-0826
Toxicity/Experimental Animals
72-0826

Pielik
see 2,4-D

Piperonyl butoxide
see also Synergists
Analysis
72-1323 72-1343
Cytological Effects
72-1028
Enzyme activity
72-1028
Factors Influencing Metabolism/Toxicity
72-1028
Integument
72-1227
Laws and Regulations
72-0679
Nervous System
72-1227
Sensory System
72-1227
Toxicity/Humans
72-1227
PMA
see also Mercurials
Digestive System
72-0791 72-1020
Endocrine System
72-1020
Excretory System
72-0791
Metabolism
72-1040
Musculoskeletal System
72-1020
Nervous System
72-0791
Reproduction/Growth
72-1020
Toxicity/Experimental Animals
72-0791 72-1020
Polychlorinated biphenyls
see also Organochlorines, Dioxins
Analysis
72-0847 72-0866
72-1313
Conferences
72-1148
Cytological Effects
72-0687 72-1039
Environmental Pollution
72-0893 72-0911
72-0929 72-1148
72-1149
Enzyme activity
72-1039 72-1077
Factors Influencing Metabolism/Toxicity
72-1164
Integument
72-1230
Metabolism
72-0838 72-1039
72-1061 72-1063
72-1245 72-1251
72-1308
Mutagenesis/ Teratogenesis
72-0687
Nervous System
72-0990 72-1077
72-1230
Reproduction/Growth
72-0687 72-0838
72-0839 72-0947
72-1061 72-1173
72-1187 72-1230
Residue Dynamics
72-1164
Residue Removal
72-1164
Residues/Food and Feed
72-0698 72-1063
72-1148 72-1230
72-1308
Residues/Plants
72-0687
Residues/Water
72-1149 72-1164
72-1246
Residues/Wildlife
72-0687 72-0847
72-0929 72-0947
72-1164 72-1173
72-1175 72-1184
72-1187
Toxicity/Experimental Animals
72-0839 72-1061
72-1246 72-1251
Toxicity/Humans
72-0990 72-1230
Toxicity/Wildlife
72-0947 72-1164
72-1246

Polychlorocamphene
see Toxaphene

Polychloropinene
see also Organochlorines
Analysis
72-1098
Biochemical Effects
72-0731 72-1278
Digestive System
72-1278
Endocrine System
72-1278
Excretory System
72-1278
Nervous System
72-0731 72-0756
Prevention
72-0940
Residues/Food and Feed
72-0940 72-1278
Residues/Soil
72-0940
Toxicity/Experimental Animals
72-1278
Toxicity/Humans
72-0731 72-0756

PP 211
see also Organophosphates
Residues/Soil
72-0690

Pralidoxime
see also Antidotes
Factors influencing
Metabolism/Toxicity
72-1069
Metabolism
72-1069

Proban
see Cythioate

Prometryne
see also Herbicides
Factors Influencing
Metabolism/Toxicity
72-0816
Metabolism
72-0816
Mutagenesis/
Teratogenesis
72-0816
Reproduction/Growth
72-0816
Residues/Soil
72-0816

5-Propargyl-2-furylmethyl-dl-cis,trans-chrysanthemate
see Furamethrin

Proparthrin
Metabolism
72-1238

Propazine
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Metabolism
72-1287
Reviews
72-1287
Toxicity/Experimental Animals
72-1044

Propham
see also Herbicides
Analysis
72-1346
Metabolism
72-0796
Reviews
72-0796

Propoxur
see also Carbamates
Metabolism
72-0796
Residue Degradation
72-0701 72-0717
Residues/Plants
72-0717
Residues/Water
72-0717
Residues/Wildlife
72-0717
Reviews
72-0796
Toxicity/Wildlife
72-0717

Prothoate
see also Organophosphates
Analysis
72-1312

Pyramine
see Pyrazon

Pyrazon
see also Herbicides
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Metabolism
72-0927
Residues/Food and Feed
72-0927
Toxicity/Experimental Animals
72-1044

Pyrethrins
see also Botanicals
Analysis
72-0857 72-1160
72-1343
Immunology
72-1160
Laws and Regulations
72-0679
Metabolism
72-1050
Nervous System
72-1279
Photodecomposition
72-0664
Reviews
72-1160
Toxicity/Experimental Animals
72-0664 72-1279
Toxicity/Humans
72-1160
Toxicity/Wildlife
72-0664

Pyrethrum
see Pyrethrins
Integument
72-1227
Nervous System
72-1227
Sensory System
72-1227
Toxicity/Humans
72-1227

Pyrolan
see also Carbamates
Residue Degradation
72-0701

Radosan
Morbidity and Mortality
Statistics
72-0988
Toxicity/Humans
72-0988

Repellants
see also Hexa, Resiston

Resiston
see also Repellants
Prevention
72-0998
Toxicity/Humans
72-0998

Resmethrin
see Pyrethrins

Rodenticides
see also Acenocumarol, Anthraquinone, ANTU, Chloralose, Crimidine, Sodium fluoroacetate, Strychnine, Thallium, Warfarin, Zinc phosphide
Laws and Regulations
72-0913
Reviews
72-0992
Toxicity/Domestic Animals
72-0992
Treatment of Poisoning
72-0992

Ronnel
see also Organophosphates
Residues/Food and Feed
72-0924 72-0925

Rotenone
see also Botanicals
Laws and Regulations
72-0679

Ruberon
see Lignisan

Salithion
Residues/Humans
72-1192
Toxicity/Humans
72-1192

Sanmicron
see PMA

Sarin
see also Organophosphates
Enzyme activity
72-0777 72-0802
Factors Influencing
Metabolism/Toxicity
72-0781 72-0802
Metabolism
72-0781

Nervous System
72-0777
Reviews
72-0781
Sensory System
72-0802
Toxicity/Experimental Animals
72-0802
Toxicity/Wildlife
72-0781
Treatment of Poisoning
72-0777 72-0802

Sayfos
see Menazon

Schradan
see also Organophosphates
Enzyme activity
72-0782
Toxicity/Experimental Animals
72-0782

SD 15803
see 2,2-Dichlorovinyl methyl octyl phosphate

SD 15418
see also Herbicides
Photodecomposition
72-0716
Residue Degradation
72-0716
Residues/Soil
72-0716

Sevin
see Carbaryl

Silvex
see also Herbicides
Analysis
72-1093
Laws and Regulations
72-0681 72-1159
Residues/Food and Feed
72-1093

Simazine
see also Herbicides
Biochemical Effects
72-1081
Carcinogenesis
72-1017
Cytological Effects
72-1081
Digestive System
72-1017
Factors Influencing Metabolism/Toxicity
72-0816
Integument
72-1017
Metabolism
72-0816 72-1081
Mutagenesis/ Teratogenesis
72-0816
Reproduction/Growth
72-0816
Residues/Soil
72-0816 72-0944

Sintiom
see Acenocumarol

Sodium arsenate
see Arsenicals

Sodium chlorate
see also Herbicides
Analysis
72-1328
Residue Dynamics
72-1328

Sodium ethylxanthogenate
see also Herbicides
Reproduction/Growth
72-1284

Sodium fluoroacetate
see also Rodenticides
Nervous System
72-0815
Toxicity/Experimental Animals
72-0815

Sodium trichloroacetate
see TCA

Sodium Trichlorophenolate
see Trichlorophenol

Soman
see also Organophosphates
Cytological Effects
72-1068
Enzyme activity
72-0802 72-1068 72-1252
Factors Influencing Metabolism/Toxicity
72-0802 72-1252
Nervous System
72-1068
Sensory System
72-0802
Toxicity/Experimental Animals
72-0802 72-1252
Treatment of Poisoning
72-0802

Strychnine
see also Rodenticides
Residue Removal
72-0938
Residues/Water
72-0938
Toxicity/Domestic Animals
72-1214
Treatment of Poisoning
72-1214

Sulfur dioxide
see also Fumigants
Residues/Food and Feed
72-0823
Toxicity/Experimental Animals
72-0823

Sumithion
see Fenitrothion

Surecide
see also Organophosphates
Analysis
72-0855

Synergists
see also n-Octyl bicycloheptene dicarboximide, Piperonyl butoxide

2,4,5-T
see also Herbicides, Dioxins
Analysis
72-0845 72-0883
Associations/ Organizations
72-0896
Carcinogenesis
72-0660
Cytological Effects
72-1292
Digestive System
72-0787
Education/Training
72-0660
Environmental Pollution
72-1129
Excretory System
72-0787 72-1292
Factors Influencing Metabolism/Toxicity
72-0787 72-1086
Laws and Regulations
72-0681 72-0684
72-0699 72-0896
72-0897 72-0898
72-0902 72-1129
72-1130 72-1150
72-1159
Metabolism
72-0779 72-0845
Mutagenesis/ Teratogenesis
72-0660 72-0779
72-0787 72-1130
Reproduction/Growth
72-0779 72-0787
72-1086
Residues/Food and Feed
72-0699
Residues/Humans
72-0845
Reviews
72-1150
Therapeutic use
72-1048
Toxicity/Experimental Animals
72-0787 72-1086
72-1292

USA
72-1129
TBHC
see Butacarb
TCA
see also Herbicides
Analysis
72-0720
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Photodecomposition
72-0720
Residue Degradation
72-0720
Residues/Water
72-0720
Toxicity/Experimental
Animals
72-1044
TCDD
see Dioxins
TDE
see also Organochlorines
Analysis
72-0920
Biochemical Effects
72-0763
Biochemical effects
72-0768
Biochemical Effects
72-1033 72-1295
Blood/Body Fluids
72-1295
Cytological Effects
72-1076 72-1255
Digestive System
72-1076
Endocrine System
72-0737 72-0763
72-1295
Enzyme activity
72-1076 72-1241
72-1242
Metabolism
72-1015 72-1076
72-1295
Nervous System
72-1015
Reproduction/Growth
72-1015 72-1033
72-1187 72-1188
Residues/Food and Feed
72-0943
Residues/Humans
72-0920 72-1188
Residues/Plants
72-0920
Residues/Wildlife
72-0705 72-1187
Therapeutic use
72-0737 72-0763
72-0768 72-1033
72-1291
Toxicity/Experimental
Animals
72-1015
Toxicity/Humans
72-0768
o,p'-TDE
see TDE
p,p'-TDE
see TDE
Temik
see Aldicarb
TEPP
see also Organophosphates
Enzyme activity
72-1294
2,3,7,8-Tetrachloro-dibenzo-p-dioxin
see Dioxins
2,3,7,8-tetrachlorodibenzo-p-dioxin
see Dioxins
2,3,7,8-Tetrachlorodibenzo-p-dioxin
see Dioxins
Tetram
see also Organophosphates
Factors Influencing
Metabolism/Toxicity
72-0781
Metabolism
72-0781
Reviews
72-0781
Toxicity/Wildlife
72-0781
Tetramethrin
see Pyrethrins
Tetramethylthiuram disulfide
see Thiram
TFM
see also Nitro compounds
Analysis
72-1080
Metabolism
72-1080
Thallium
see also Rodenticides
Analysis
72-1351
Digestive System
72-0764
Enzyme activity
72-1231
Musculoskeletal System
72-1231
Nervous System
72-0764 72-1233
Sensory System
72-0730
Toxicity/Humans
72-0730 72-0764
72-1233
Treatment of Poisoning
72-0764
Thiabendazole
see also Fungicides, Herbicides
Analysis
72-0859
Blood/Body Fluids
72-1304
Cardiovascular System
72-1304
Enzyme activity
72-1304
Factors Influencing Metabolism/Toxicity
72-1304
Residues/Food and Feed
72-0859
Respiratory System
72-1304
Toxicity/Experimental
Animals
72-1304
Thiodan
see Endosulfan
Thiometon
see also Organophosphates
Residue/Air
72-1203
Sensory System
72-1207
Toxicity/Experimental
Animals
72-1207
Toxicity/Humans
72-1207
Thiram
see also Carbamates, Fungicides
Biochemical Effects
72-1240
Blood/Body Fluids
72-0817 72-0818
Endocrine System
72-0818
Factors Influencing Metabolism/Toxicity
72-1240
Immunology
72-1024
Toxicity/Experimental
Animals
72-0817 72-0818
72-1024 72-1240
Tillam
see Pebulate
Tin compounds
see also Fungicides

Analysis
72-1123
TMTD
see Thiram
TOCP
see Tri-o-cresyl phosphate
Tordon-22K
see Picloram
Toxaphene
see also Organochlorines
Analysis
72-1098
Cytological Effects
72-1060
Digestive System
72-1060
Environmental Pollution
72-0912
Factors Influencing Metabolism/Toxicity
72-1060
Metabolism
72-1060
Residue Degradation
72-0951
Residue/Air
72-0951
Residues/Plants
72-0951
Residues/Soil
72-0713
Residues/Water
72-0713
Toxicity/Experimental Animals
72-1060
Toxicity/Wildlife
72-0912
2,4,5-TP
see Silvex
Triallate
see also Herbicides
Metabolism
72-1259
Triamiphos
see also Organophosphates
Enzyme activity
72-0803
Respiratory System
72-0803
Toxicity/Experimental Animals
72-0803
Trichlorfon
see also Organophosphates
Analysis
72-0921 72-1124
Biochemical Effects
72-0825 72-0829
Biochemical effects
72-0829
Biochemical Effects
72-0833 72-1081
72-1256
Blood/Body Fluids
72-0825
Blood/body fluids
72-0829
Blood/Body Fluids
72-0829 72-0833
72-1256 72-1304
Cardiovascular System
72-0772 72-0833
72-1304
Cytological Effects
72-1081
Digestive System
72-0755 72-0772
72-0829 72-0833
Endocrine System
72-0833
Enzyme activity
72-0725 72-0825
72-0829 72-0832
72-0833 72-1256
72-1304
Factors Influencing Metabolism/Toxicity
72-0833 72-1304
Immunology
72-0825
Metabolism
72-1081
Musculoskeletal System
72-0771 72-0772
72-0833
Nervous System
72-0755 72-0771
72-0772 72-0833
72-0994
Reproduction/Growth
72-0833
Residue Degradation
72-0725
Residues/Domestic Animals
72-0832
Residues/Food and Feed
72-0725 72-0833
72-0921
Respiratory System
72-1304
Toxicity/Experimental Animals
72-0825 72-0829
72-0832 72-0833
72-1256 72-1304
Toxicity/Humans
72-0755 72-0771
72-0772 72-0994
Treatment of Poisoning
72-0772
1,1,1-Trichloro-2,2-bis(5'-chloro-2'-methoxyphenyl)ethane
see MPA
Trichlorophenol
Reproduction/Growth
72-1284
Trichloropropionitrile
see also Organochlorines
Blood/Body Fluids
72-1044
Enzyme activity
72-1044
Integument
72-1044
Toxicity/Experimental Animals
72-1044
Tri-o-cresyl phosphate derived compounds
Enzyme activity
72-1252
Factors Influencing Metabolism/Toxicity
72-1252
Toxicity/Experimental Animals
72-1252
Tri-o-cresyl phosphate
Enzyme activity
72-1252
Factors Influencing Metabolism/Toxicity
72-1252
Nervous System
72-0989
Prevention
72-0989
Toxicity/Experimental Animals
72-1252
Toxicity/Humans
72-0989
3-Trifluoromethyl-4-nitrophenol
see TFM
Trifluralin
see also Herbicides
Metabolism
72-1001
Reproduction/Growth
72-1001
Triphenyltin
see also Fungicides
Photodecomposition
72-1204
Trithiocyanuric acid
see also Herbicides
Cytological Effects
72-1243
Digestive System
72-1243
Toxicity/Experimental Animals
72-1243
Trithion
see Carbophenothion

UC-10854
see 3-Isopropylphenyl N-methylcarbamate
Vapam
see Metham
Warfarin
see also Rodenticides
Blood/Body Fluids
72-1215
Cardiovascular System
72-1215
Factors Influencing Metabolism/Toxicity
72-0985
Nervous System
72-0985
Toxicity/Domestic Animals
72-1215
Toxicity/Humans
72-0985
Treatment of Poisoning
72-0985
Wofatox
see Methyl parathion
Yalan
see EPTC
Zectran
see also Carbamates
Metabolism
72-1254
Toxicity/Wildlife
72-0966
Zinc phosphide
see also Rodenticides
Digestive System
72-0755
Morbidity and Mortality Statistics
72-0983
Nervous System
72-0755
Residues/Food and Feed
72-0958
Toxicity/Domestic Animals
72-0983
Toxicity/Humans
72-0755
Zineb
see also Fungicides
Analysis
72-1327
Digestive System
72-1023
Endocrine System
72-1023
Enzyme activity
72-1023
Excretory System
72-1023
Immunology
72-1024
Mutagenesis/ Teratogenesis
72-1023
Nervous System
72-1023
Prevention
72-0760
Reproduction/Growth
72-1023
Respiratory System
72-0760 72-1023
Toxicity/Experimental Animals
72-1023 72-1024
Toxicity/Humans
72-0760
Ziram
see also Carbamates, Fungicides
Analysis
72-1327
Blood/Body Fluids
72-0752
Enzyme activity
72-0732
Integument
72-0752
Musculoskeletal System
72-0732
Residue/Air
72-0752
Residues/Humans
72-0752
Respiratory System
72-0752
Sensory System
72-0752
Toxicity/Humans
72-0732 72-0752
Zoocoumarin
Digestive System
72-0755
Nervous System
72-0755
Toxicity/Humans
72-0755

Alternative Controls
72-0901
Aldrin
72-1153
Calcium cyanide
72-1138
DDT
72-1153
Dieldrin
72-1153
Endrin
72-1153
Fungicides
72-1152
Heptachlor
72-1153
Herbicides
72-1152
Mercurials
72-1152
Organochlorines
72-0663 72-0982
72-1152
Organophosphates
72-0663 72-0982
Petroleum oils
72-1138
Analysis
General
72-1314
Atrazine
72-0877
DDT
72-0708
Dieldrin
72-0708 72-0919
Diuron
72-0877
Fungicides
72-1317
Heptachlor epoxide
72-0708
Herbicides
72-1317
Lindane
72-0708
Methoxychlor
72-0708
Organochlorines
72-1316
Pyrethrins
72-1160
Bioassay
72-1176 72-1341
Benomyl
72-1348
2,4-D
72-0883
Herbicides
72-1353
Organophosphates
72-1352
2,4,5-T
72-0883
Calorimetry
Dimefox
72-0850
Cholinesterase/enzyme
72-1111
Aldrin
72-1344
Carbamates
72-0795 72-0879
72-0882
Copper oxychloride
72-1327
Diazinon
72-0733
Dichlorvos
72-0921
Dieldrin
72-1344
Dimefox
72-0850
Endrin
72-1344
Fenitrothion
72-0865 72-0878
Fentin acetate
72-1327
Ferbam
72-1327
Maneb
72-1327
Organochlorines
72-0879
Organophosphates
72-0795 72-1104
72-1108 72-1335
Silvex
72-1093
Trichlorfon
72-0921
Zineb
72-1327
Ziram
72-1327
Chromatography
Column
DDT
72-0920
DDT derived
compounds
72-0920
DDT isomers
72-0920
Fenitrothion
72-0878
Lindane
72-0920
Organochlorines
72-0848
Piperonyl butoxide
72-1323
TDE
72-0920
Electrophoresis
Mercurials
72-0861
Gas-liquid
72-1109 72-1113
72-1336
Aldrin
72-0688 72-1319
72-1321 72-1330
72-1331 72-1344
Allethrin
72-1166
Benthiocarb
72-0840
BHC
72-0844 72-1196
72-1296
BHC isomers
72-0688
Biphenyl
72-1122
Carbamates
72-0880 72-1116
72-1196 72-1315
72-1320
Carbetamide
72-1115
Chlorbromuron
72-0863
Chlordane
72-1329
gamma-Chlordane
72-1329
Chlorfenvinphos
72-1338
Chlorpropham
72-1322
Conen
72-0856
2,4-DB
72-1333
DDT
72-0688 72-0843
72-0844 72-0920
72-1095 72-1196
72-1296
DDT derived
compounds
72-0688 72-0843
72-0844 72-0920
72-0972 72-1095
DDT isomers
72-0920
72-1095
Dichlorprop
72-1333
Dichlozoline
72-0858
Dieldrin
72-0688 72-1319
72-1321 72-1331
72-1344
Dimetachlone
72-0858
Dioxins
72-0849 72-0959
72-1313

2,4-D
72-0845 72-1333
72-1334
Endosulfan
72-1096
Endosulfan derived compounds
72-1096
Endrin
72-1344
EPTC
72-0869
Heptachlor
72-1319 72-1321
Heptachlor epoxide
72-1319 72-1321
72-1329
Herbicides
72-0880
Lindane
72-0688 72-0843
72-0920 72-1296
72-1319 72-1321
Linuron
72-0863
Malathion
72-0847 72-1196
72-1332
Metobromuron
72-0863
Monolinuron
72-0863
n-Octyl bicycloheptene dicarboximide
72-1343
Organochlorines
72-0847 72-1105
72-1349
Parathion
72-0847 72-0880
72-1107 72-1196
Pebulate
72-0869
Piperonyl butoxide
72-1343
Polychlorinated biphenyls
72-0847 72-0866
72-1313
Pyrethrins
72-0857 72-1343
Silvex
72-1093
TDE
72-0920
2,4,5-T
72-0845
Gel Permeation
Malathion
72-0847
Organochlorines
72-0847
Parathion
72-0847
Polychlorinated biphenyls
72-0847
Thin-layer
72-1324
Aldrin
72-0874
Benomyl
72-1348
BHC
72-0870 72-1337
Carbamates
72-0851 72-0879
72-0882 72-1325
72-1326
Carbaryl
72-0887 72-1112
Conen
72-0854
Cyanox
72-0855
Cythioate
72-1318
DDT
72-0870 72-1103
72-1117 72-1337
Dichlorprop
72-0842
Dichlorvos
72-0921
Dicofol
72-1339
Dimethoate
72-1101
3,4,-Dimethylphenyl N-methyl carbamate
72-0853
Dinobuton
72-1340
Endrin
72-1103
Furamethrin
72-1345
Heptachlor
72-1103
Heptachlor epoxide
72-1118
Imidan
72-0886
Lindane
72-1103
MCPP
72-0842
Menazon
72-1099
MTMC
72-0852 72-0853
Organochlorines
72-0876 72-0879
72-0881
Organophosphates
72-0876 72-1108
72-1119
Parathion
72-1107
Polychloropinene
72-1098
Prothoate
72-1312
Surecide
72-0855
TFM
72-1080
Thiabendazole
72-0859
Tin compounds
72-1123
Toxaphene
72-1098
Trichlorfon
72-0921 72-1124
Electrometry
Amperometry
Propham
72-1346
Polarography
Acenocumarol
72-1350
DNOC
72-0872
Fenitrothion
72-0878
Menazon
72-0873
Organophosphates
72-0868 72-1342
Gravimetry
72-1102
Prothoate
72-1312
Spectrometry
Atomic absorption/emission
72-1109
Arsenicals
72-0862
Organochlorines
72-0867
Organophosphates
72-0860
Colorimetry
Acrofol
72-1100
Aldicarb
72-1347
Calcium chlorate-chloride
72-1100
Chlorpropham
72-1114
Conen
72-0854
CPAS
72-1097
DDT
72-0702
DDT derived compounds
72-0702

Dichlorodiphenylethane
72-1097
Dichlorprop
72-0841
Dichlorvos
72-1110
3,4,-Dimethylphenyl N-methyl carbamate
72-0853
2-(1,3-Dioxolane-2-yl)-phenyl-N-methylcarbamate
72-0864
2,4-D
72-0841 72-0945
Fenitrothion
72-0885
Granosan
72-0884
Lindane
72-1120
Magnesium chlorate-chloride
72-1100
MCPA
72-0841
Mercurials
72-0884
MTMC
72-0852 72-0853
Organophosphates
72-1110
Sodium chlorate
72-1328
Thallium
72-1351
Thiabendazole
72-0859
Fluorometry
Herbicides
72-0721
Infrared
72-1113
Organochlorines
72-0846
Mass spectrometry
Aldrin
72-1321
Dieldrin
72-1321
Dioxins
72-0849
Heptachlor
72-1321
Heptachlor epoxide
72-1321
Lindane
72-1321
Parathion
72-1107
Polychlorinated biphenyls
72-0866
UV
Biphenyl
72-1122
Carbamates
72-0851
Carbaryl
72-1106
Cyanox
72-0855
Furamethrin
72-1345
Mercurials
72-1121
Organochlorines
72-1121
Organophosphates
72-1121
Surecide
72-0855
TFM
72-1080
Spot test
Paraquat
72-1224
Titration
Chlorbromuron
72-0863
Linuron
72-0863
Metobromuron
72-0863
Monolinuron
72-0863
Associations/Organizations
72-0892 72-0901
72-1142 72-1151
72-1157
Chlordane
72-0905
Heptachlor
72-0905
Lindane
72-0905
Malathion
72-0905
2,4,5-T
72-0896
Beneficial Effects
72-0670 72-1143
DDT
72-0662 72-0675
72-1158 72-1161
Herbicides
72-0662
Mirex
72-1136
Picloram
72-0682
Biochemical Effects
General
Animals/Experimental
Aldrin
72-1041
Carbaryl
72-1016
Dichlorvos
72-0828
Dieldrin
72-1041
Endrin
72-1041
alpha-Naphthyl isothiocyanate
72-1013
Amino acids/peptides/proteins
Animals/Experimental
Antidotes
72-1256
Carbaryl
72-0830
DEF
72-0835
DFP
72-1286
Dimethoate
72-0833
Dioxins
72-1260
Hexachlorobutadiene
72-0820
Lindane
72-0834
Maneb
72-0830
Methyl bromide
72-0821
Oxydemeton methyl
72-0835
TDE
72-1295
Trichlorfon
72-0825 72-0829
72-0833 72-1256
Human
Mercurials
72-1000
In vitro
Aldrin
72-1081
Carbaryl
72-1081
DDT
72-1081
Dimethoate
72-1081
Fumigants
72-1081
Fungicides
72-1081
Mercurials
72-0861
Parathion
72-1081
Simazine
72-1081
Trichlorfon
72-1081

Carbohydrates
Animals/Experimental
DDT
72-1065 72-1071
DDT isomers
72-1065
DEF
72-0835
Dichloronitrophenol
72-0819
Dinitro-isopropylphenol
72-0819
Dinitrophenol
72-0819
DNBP
72-0819
DNOC
72-0819
Organophosphates
72-0888
Oxydemeton methyl
72-0835
Parathion
72-0789
Human
Organophosphates
72-1217
Catecholamines
Animals/Experimental
Diban
72-1239
Organophosphates
72-0888
Thiram
72-1240
Human
Polychloropinene
72-0731
Hormones
Human
TDE
72-0763
Lipids/steroids/sterols
DDT
72-0702
DDT derived compounds
72-0702
Animals/Experimental
Carbon Tetrachloride
72-1293
DDT
72-1264
DFP
72-1286
Ethylene dibromide
72-1293
Lindane
72-0834
Maneb
72-0822
TDE
72-1295
Human
TDE
72-0768 72-1033
In vitro
DDT derived compounds
72-1276
Minerals
Animals/Experimental
Dichloronitrophenol
72-0819
Dinitro-isopropylphenol
72-0819
Dinitrophenol
72-0819
DNBP
72-0819
DNOC
72-0819
Nucleic Acids
Animals/Experimental
BHC Isomers
72-0801
In vitro
Aldrin
72-1081
Carbaryl
72-1081
DDT
72-1081
Dimethoate
72-1081
Fumigants
72-1081
Fungicides
72-1081
Parathion
72-1081
Simazine
72-1081
Trichlorfon
72-1081
Photosynthesis
Plant
DDT
72-0794
Porphyrins
Animals/Experimental
Dinoprop
72-1302
Dinoseb
72-1302
Hexachlorobenzene
72-1037 72-1263
Human
Hexachlorobenzene
72-1263
Respiration
In vitro
PCP
72-0799
PCP derived compounds
72-0799
Vitamins/coenzymes
Animals/Experimental
DDT
72-0786 72-1053
72-1054
DDT isomers
72-1053 72-1054
Dicresyl
72-0836
Formothion
72-1277
Hexachlorobutadiene
72-0820
Lindane
72-0786
Polychloropinene
72-1278
Blood/Body Fluids
General
Animals/Domestic
Warfarin
72-1215
Animals/Experimental
Carbaryl
72-0817
Dichlorvos
72-1304
Lindane
72-0793
NC 250
72-1297
Thiabendazole
72-1304
Thiram
72-0817
Trichlorfon
72-1304
Human
BHC
72-0971
DDT
72-0971
Nitro compounds
72-0971
Organochlorines
72-1226
Organophosphates
72-1226
Blood-brain barrier
Animals/Experimental
Aldrin
72-1088
DDT
72-1088
Dieldrin
72-1088
Endrin
72-1088
Cells
Animals/Experimental
Antidotes
72-1256
Barban
72-1044

Carbaryl
72-0757 72-0818
Celatox
72-1044
Chlorbufam
72-1044
DDT
72-1089
DEF
72-0835
Di-allate
72-1044
Dichloral urea
72-1044
Dichloran
72-0798
Dicresyl
72-0836
EPTC
72-0818
Hexachlorobutadiene
72-0820
MCPA
72-1044
alpha-Naphthyl isothiocyanate
72-1013
Oxydemeton methyl
72-0835
Propazine
72-1044
Pyrazon
72-1044
TCA
72-1044
Thiram
72-0818
Trichlorfon
72-0825 72-1256
Trichloropropionitrile
72-1044
Human
Azinphosmethyl
72-1073
Carbophenothion
72-1073
DDT
72-0759 72-1229
Diazinon
72-0728
Disulfoton
72-1073
2,4-D
72-1229
Fenthion
72-1229
Lindane
72-0759 72-1229
Maneb
72-0753
Mercurials
72-0719 72-1000
Mevinphos
72-1073
Parathion
72-0728
Ziram
72-0752
In vitro
Allethrin
72-1078
DDT
72-1078
Plasma/serum
Animals/Experimental
BHC
72-1296
Carbaryl
72-0830
DDT
72-1296
Dimethoate
72-0833
Formothion
72-1277
Lindane
72-1296
Maneb
72-0830
TDE
72-1295
Trichlorfon
72-0825 72-0829
72-0833
Human
Azinphosmethyl
72-1073
BHC
72-1296
Carbophenothion
72-1073
DDT
72-1296
Disulfoton
72-1073
Lindane
72-1296
Mercurials
72-0719 72-1000
Mevinphos
72-1073

Carcinogenesis
General
Aldrin
72-0660
DDT
72-0660
Dieldrin
72-0660
Monuron
72-1043
2,4,5-T
72-0660
Animals/experimental
72-0788
BHC
72-1012
BHC isomers
72-1300
Cyanuric acid
72-1017
DDT
72-1003
Lindane
72-1300
Monuron
72-0805
Simazine
72-1017
Humans
72-0765
Aramite
72-0761
Arsenicals
72-0761
DDT
72-0761
Organophosphates
72-0761

Cardiovascular System
General
Animals/Domestic
Warfarin
72-1215
Human
Dinocap
72-1218
Blood pressure
Animals/Experimental
Dieldrin
72-1273
Endrin
72-1273
Human
BHC
72-0970
Trichlorfon
72-0772
Blood vessels
Animals/Domestic
Fluor chrome arsenate phenol
72-0736
Animals/Experimental
Atrazine
72-1309
Dichlorvos
72-0828
Dimethoate
72-0833
Maneb
72-0822
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
Trichlorfon
72-0833
Human
Methyl parathion
72-0979
Edema
Human
Methyl parathion
72-0979

Heart
Animals/Experimental
Dichlorvos
72-1304
Maneb
72-0822
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
Paraquat
72-1223
Picloram
72-0826
Thiabendazole
72-1304
Trichlorfon
72-1304
Human
BHC
72-0970
Binapacryl
72-1218
Diazinon
72-0728
Mercurials
72-1000
Parathion
72-0728
Trichlorfon
72-0772
Hyperemia
Human
Methyl parathion
72-0979
Conferences
72-0677 72-0900
72-1144 72-1181
DDT
72-0661
Lead
72-0910
Organochlorines
72-1133
Polychlorinated biphenyls
72-1148
Cytological Effects
General
Animals/Experimental
2,4-D
72-1292
Toxaphene
72-1060
2,4,5-T
72-1292
In vitro
Aldrin
72-1081
Carbaryl
72-1081
DDT
72-1067 72-1081
Dimethoate
72-1081
Fumigants
72-1081
Fungicides
72-1081
Parathion
72-1081
Simazine
72-1081
Soman
72-1068
Trichlorfon
72-1081
Chromosomes/genes
Wildlife
Polychlorinated biphenyls
72-0687
Cloning
In vitro
DDT
72-0776
Dicofol
72-0776
Growth
Animals/Experimental
BHC Isomers
72-0801
In vitro
DDT
72-0776
Dicofol
72-0776
Microsomes
Animals/Experimental
Chlordane
72-1014
Ovex
72-0809
Piperonyl butoxide
72-1028
Polychlorinated biphenyls
72-1039
TDE
72-1076
Human
Aldrin
72-1344
Dieldrin
72-1344
Endrin
72-1344
Piperonyl butoxide
72-1028
Mitochondria
Animals/Experimental
Monuron
72-1043
In vitro
PCP
72-0799
PCP derived compounds
72-0799
Morphology
Animals/Experimental
Atrazine
72-1309
Dithiocyanuric acid
72-1243
2,4-Dithio-6-methyl-s-triazine
72-1243
Monothiocyanuric acid
72-1243
Monuron
72-0805
Trithiocyanuric acid
72-1243
In vitro
TDE
72-1255
Digestive System
General
Animals/Domestic
ANTU
72-0738
Fluor chrome arsenate phenol
72-0736
Animals/Experimental
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
Human
72-1228
Parathion
72-1205
Trichlorfon
72-0772
Alimentary tract
Animals/Experimental
DEF
72-0723 72-0835
2,2-Dichlorovinyl methyl octyl phosphate
72-1010
Dicresyl
72-0836
Granosan
72-1020
Mercuran
72-1020
Mercurhexane
72-1020
Oxydemeton methyl
72-0835
Phenylmercuric bromide
72-1020
PMA
72-1020
Human
BHC
72-0970
Diazinon
72-0733

Organochlorines
72-0967
Organophosphates
72-0967
Paraquat
72-1222
Thallium
72-0764
Digestive glands
Animals/Experimental
Monuron
72-0805
Liver
Animals/Domestic
Granosan
72-0976
Animals/Experimental
Atrazine
72-1309
BHC
72-1012
BHC Isomers
72-0801
Chlordane
72-1014
Cyanuric acid
72-1017
DDT
72-1091
DEF
72-0723
Dichlorvos
72-0828
Dimethoate
72-0833
Dinoprop
72-1302
Dinoseb
72-1302
Dioxins
72-0787 72-1260
Dithiocyanuric acid
72-1243
2,4-Dithio-6-methyl-s-triazine
72-1243
Formothion
72-1277
Hexachlorobenzene
72-1263
Lindane
72-0793
Mancozeb
72-1023
Maneb
72-0822 72-1023
Monothiocyanuric acid
72-1243
Monuron
72-0805 72-1043
alpha-Naphthyl isothiocyanate
72-1013
NC 250
72-1298
Ovex
72-0809
Paraquat
72-1223
Parathion
72-0789
PMA
72-0791
Polychloropinene
72-1278
Simazine
72-1017
TDE
72-1076
Toxaphene
72-1060
Trichlorfon
72-0829 72-0833
Trithiocyanuric acid
72-1243
2,4,5-T
72-0787
Zineb
72-1023
Human
ANTU
72-0755
Carbamates
72-0773
DDT
72-0755 72-1216
Diazinon
72-0728
Hexachlorobenzene
72-1263
Lindane
72-1216
Organochlorines
72-0754 72-0967
Organophosphates
72-0754 72-0773
72-0967
Parathion
72-0728
Trichlorfon
72-0755
Zinc phosphide
72-0755
Zoocoumarin
72-0755
In vitro
PCP
72-0799
PCP derived compounds
72-0799
Wildlife
DDT
72-0808
Dieldrin
72-0808
Methoxychlor
72-0808
Education/Training
72-0676 72-0914
72-0973 72-1142
Aldrin
72-0660
DDT
72-0660
Dieldrin
72-0660
2,4,5-T
72-0660
Endocrine System
General
Animals/Experimental
Atrazine
72-1309
Carbaryl
72-1016
2,4-DB
72-1022
Adrenal
Animals/Experimental
Carbaryl
72-0818
DDT
72-1071
EPTC
72-0818
Maneb
72-0822
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
Parathion
72-0789
Polychloropinene
72-1278
TDE
72-1295
Thiram
72-0818
Human
DDT
72-0980
TDE
72-0763
Gonads
Animals/Experimental
Granosan
72-1020
Maneb
72-0822 72-0831
Mercuran
72-1020
Mercurhexane
72-1020
Phenylmercuric bromide
72-1020
PMA
72-1020
Pituitary
Animals/Experimental
Carbaryl
72-0757

Paraoxon
72-1092
Human
TDE
72-0737
Spleen
Animals/Experimental
Dimethoate
72-0833
Lindane
72-0793
2-Methyl-1-naphthyl
N-methyl carbamate
72-0837
Picloram
72-0826
Polychloropinene
72-1278
Trichlorfon
72-0833
Thyroid
Animals/Experimental
Carbamates
72-1258
Carbaryl
72-0818 72-0830
EPTC
72-0818
Fungicides
72-1258
Mancozeb
72-1023
Maneb
72-0830 72-1023
Thiram
72-0818
Zineb
72-1023
Environmental Pollution
72-0666 72-0667
72-0670 72-0677
72-0900 72-0904
72-0907 72-0915
72-1126 72-1131
72-1132 72-1137
72-1151 72-1155
Aldrin
72-0912
BHC
72-0673 72-0674
72-0693 72-0697
DDT
72-0662 72-0673
72-0674 72-0675
72-0697 72-0909
72-0912 72-0916
72-0917 72-0929
72-1127 72-1145
72-1156 72-1161
72-1162
DDT derived
compounds
72-0929
DDT isomers
72-0929
Dibromochloropropane
72-0751
Dieldrin
72-0697 72-0912
72-1156
Dioxins
72-0911 72-0959
Endrin
72-0912
Fungicides
72-1152
Herbicides
72-0662 72-0899
72-1152 72-1182
Hexa
72-1182
Lead
72-0910
Lindane
72-0693
Mercurials
72-0673 72-0691
72-0704 72-0890
72-0891 72-0906
72-0911 72-1141
72-1152 72-1200
Organochlorines
72-0663 72-0691
72-0707 72-0906
72-0909 72-0911
72-1133 72-1152
72-1154 72-1182
Organophosphates
72-0663 72-0691
72-1182
Parathion
72-0673 72-0697
Polychlorinated
biphenyls
72-0893 72-0911
72-0929 72-1148
72-1149
Toxaphene
72-0912
Enzyme activity
General
72-1111
Abate
72-1029
Antidotes
72-1256
Aprocarb
72-0814
BHC Isomers
72-0801
Butacarb
72-0814
Carbamates
72-0795
Carbaryl
72-0814 72-1016
72-1072
Carbaryl derived
compounds
72-1072
Chlordane
72-1014
Crimidine
72-1271
DDT
72-0762 72-0786
72-1032 72-1071
72-1253
DDT isomers
72-1032
Heptachlor
72-1087
Lindane
72-0785 72-0786
Mancozeb
72-1023
Maneb
72-1023
Monuron
72-1043
alpha-Naphthyl
isothiocyanate
72-1013
Organophosphates
72-0795
Parathion
72-1231
Piperonyl butoxide
72-1028
Polychlorinated
biphenyls
72-1039
TDE
72-1076
Thallium
72-1231
Trichlorfon
72-1256
Zineb
72-1023
Acid phosphatase
Aldrin
72-1241
DDT
72-1241
DDT derived
compounds
72-1241
Dieldrin
72-1241
Lindane
72-1241
TDE
72-1241
Adenosine triphosphatase
Allethrin
72-1078
DDT
72-0813 72-1067
72-1070 72-1078
DDT derived
compounds
72-0813
Dicofol
72-0813

PCP
72-0799
PCP derived compounds
72-0799
Polychlorinated biphenyls
72-1077
Alkaline phosphatase
Aldrin
72-1241
DDT
72-1241
DDT derived compounds
72-1241
Dieldrin
72-1241
Lindane
72-1241
TDE
72-1241
Butylcholinesterase
Schradan
72-0782
Carbonic anhydrase
DDT
72-0810 72-1084
72-1089
DDT derived compounds
72-0810
DDT isomers
72-1084
Dieldrin
72-0810
Carboxylase
BHC
72-0792
DDT
72-0792
EPN
72-0792
Fenitrothion
72-0792
Malathion
72-0792
Catalase
Hexachlorobutadiene
72-0820
Cholinesterase
72-1220
Abate
72-1029
Antidotes
72-1270
Azinphosmethyl
72-1073
Barban
72-1044
BHC
72-0792
Carbamates
72-0773 72-0795
72-1051
Carbaryl
72-0722
Carbophenothion
72-1073
Celatox
72-1044
Chlorbufam
72-1044
Chlorfenvinphos
72-0790
Crotoxyphos
72-0790
DDT
72-0792 72-0812
72-1065 72-1210
DDT isomers
72-1065
DEF
72-0723 72-0835
72-0968
DFP
72-0775 72-1031
72-1294
Di-allate
72-1044
Diazinon
72-0728 72-0733
72-0734
Dichloral urea
72-1044
2,2-Dichlorovinyl methyl octyl phosphate
72-1010
Dichlorvos
72-0790 72-1304
Dicresyl
72-0722
Dicrotophos
72-0790
Dieldrin
72-0812
Dimethoate
72-0833
Disulfoton
72-1073
EPN
72-0792
Fenitrothion
72-0792
Formothion
72-1277
Heptachlor
72-0812
Lindane
72-0812
Malathion
72-0735 72-0792
MCPA
72-1044
Methyl Mercaptophos
72-0968
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
Mevinphos
72-0790 72-1073
Monocrotophos
72-0790
NC 250
72-1297
Organochlorines
72-0995 72-1226
Organophosphates
72-0773 72-0795
72-0888 72-0995
72-1009 72-1210
72-1217 72-1221
72-1226 72-1266
72-1272 72-1290
Ovex
72-0809
Oxydemeton methyl
72-0835
Paraoxon
72-0790 72-1092
72-1270
Parathion
72-0728 72-0790
72-1062 72-1074
72-1205
Propazine
72-1044
Pyrazon
72-1044
Sarin
72-0777 72-0802
Schradan
72-0782
Soman
72-0802 72-1068
72-1252
TCA
72-1044
TEPP
72-1294
Thiabendazole
72-1304
Triamiphos
72-0803
Trichlorfon
72-0725 72-0832
72-0833 72-1304
Trichloropropionitrile
72-1044
Tri-o-cresyl phosphate derived compounds
72-1252
Tri-o-cresyl phosphate
72-1252
Ziram
72-0732
Glutamic oxalacetic transaminase
Aldrin
72-1242
DDT
72-0812 72-1242

DDT derived compounds 72-1242
Dieldrin 72-0812 72-1242
Heptachlor 72-0812
Lindane 72-0812 72-1242
NC 250 72-1297
TDE 72-1242
Trichlorfon 72-0829
Glutamic pyruvic transaminase
Aldrin 72-1242
DDT 72-1242
DDT derived compounds 72-1242
Dieldrin 72-1242
Lindane 72-1242
NC 250 72-1297
TDE 72-1242
Trichlorfon 72-0829
Lysozyme
Trichlorfon 72-0825
Peroxidase
Barban 72-1044
Celatox 72-1044
Chlorbufam 72-1044
Di-allate 72-1044
Dichloral urea 72-1044
Hexachlorobutadiene 72-0820
MCPA 72-1044
Propazine 72-1044
Pyrazon 72-1044
TCA 72-1044
Trichloropropionitrile 72-1044
Phosphatase
BHC 72-0792
DDT 72-0792
EPN 72-0792
Fenitrothion 72-0792
Malathion 72-0792
Proteinases
DFP 72-1285
Ribonuclease
Chlordane 72-0774
DDT 72-0774 72-0829
Succinic dehydrogenase
DDT 72-0808
Dieldrin 72-0808
Maneb 72-0753 72-0822
Methoxychlor 72-0808
Transaminase
Hexachlorobutadiene 72-0820
Transferases
DFP 72-1286
17-beta-Hydroxysteroid dehydrogenase
DDT derived compounds 72-1276

Excretory System

General
Human
Mercurials 72-1000
Bladder/ducts
Animals/Experimental
Endosulfan 72-1289
Kidney
Animals/Domestic
ANTU 72-0738
Animals/Experimental
Atrazine 72-1309
BHC 72-1296
DDT 72-1032 72-1065 72-1071 72-1296
DDT isomers 72-1032 72-1065
Dichlorvos 72-0828
Dicresyl 72-0836
Dioxins 72-0787
2,4-D 72-1292
Endosulfan 72-1289
Lindane 72-0793 72-1296
Mancozeb 72-1023
Maneb 72-1023
NC 250 72-1298
Paraquat 72-1223
PMA 72-0791
Polychloropinene 72-1278
2,4,5-T 72-0787 72-1292
Zineb 72-1023
Human
Paraquat 72-1222
Wildlife
DDT 72-0808
Dieldrin 72-0808
Methoxychlor 72-0808

Experimental Design 72-0788 72-0797 72-1176 72-1341
Fungicides 72-1152
Herbicides 72-0721 72-1152
Mercurials 72-1121 72-1152
Organochlorines 72-0707 72-1121 72-1152
Organophosphates 72-1121

Factors Influencing Metabolism/Toxicity

Adaptation
DDT 72-0776 72-1007
Dicofol 72-0776
Age
Organophosphates 72-0739
Biological magnification 72-1165
DDT 72-1164
Polychlorinated biphenyls 72-1164
Crowding
BHC 72-0970

Dieldrin
72-1273
Endrin
72-1273
Diet
DDT
72-1086
Heptachlor
72-1087
2,4,5-T
72-1086
Disease state
72-1111
Fluor chrome
arsenate phenol
72-0736
Nitro compounds
72-0987
Organochlorines
72-0987
Organophosphates
72-0987
Interactions
Abate
72-1029
Aldrin
72-0807
Anthraquinone
72-0985
ANTU
72-0985
BHC
72-1299
Carbaryl
72-1072
Carbaryl derived
compounds
72-1072
Chloralose
72-0985
Chlordane
72-0807 72-1014
Crimidine
72-1271
DDT
72-0807 72-0808
72-1299
Dichlorvos
72-1299 72-1304
Dieldrin
72-0807 72-0808
72-1052
Endosulfan
72-0807
Fenitrothion
72-1299
Heptachlor
72-0807
Hexachlorobenzene
72-1037
Lindane
72-0785 72-0807
Malathion
72-1299
Methoxychlor
72-0808
Organophosphates
72-0888
Parathion
72-1274 72-1299
PCP
72-1299
Piperonyl butoxide
72-1028
Sarin
72-0802
Soman
72-0802 72-1252
Thiabendazole
72-1304
Thiram
72-1240
Trichlorfon
72-1304
Tri-o-cresyl
phosphate derived
compounds
72-1252
Tri-o-cresyl
phosphate
72-1252
Warfarin
72-0985
Light/radiation
Dichloran
72-0798
Nutritional state
DDT
72-0786
Dieldrin
72-1082
Lindane
72-0786
pH
Organophosphates
72-1272
Route
72-0973
Chlorfenvinphos
72-0790 72-1301
Chlorphenvinphos
72-0781
Crotoxyphos
72-0790 72-1301
DDT
72-1075
Dichlorvos
72-0790 72-1301
Dicrotophos
72-0781 72-0790
72-1301
Dieldrin
72-0781
Dimethoate
72-0833
DNOC
72-1025
Isolan
72-0781
Mercurials
72-1075
Mevinphos
72-0790 72-1301
Monocrotophos
72-0781 72-0790
72-1301
Paraoxon
72-0790 72-1301
Parathion
72-0790 72-1301
Sarin
72-0781
Tetram
72-0781
Trichlorfon
72-0833
Schedule of dosage
Arsenicals
72-1027
Sex
DDT
72-1264
Dieldrin
72-1052
Toxaphene
72-1060
Solubility
Atrazine
72-0816
Organophosphates
72-1272
Prometryne
72-0816
Simazine
72-0816
Species
Aldrin
72-1088
DDT
72-0786 72-1034
72-1088
Dieldrin
72-1034 72-1088
Dioxins
72-0787
2,4-D
72-1034
Endrin
72-1088
Lindane
72-0786
Parathion
72-1274
2,4,5-T
72-0787
Stress
Pralidoxime
72-1069
Temperature
BHC
72-0970
DEF
72-0835

Dieldrin
72-1273
Endrin
72-1273
Oxydemeton methyl
72-0835
Immunology
General
72-0677
Pyrethrins
72-1160
Animals/experimental
BHC
72-1019
Carbaryl
72-1024
DDT
72-1024 72-1091
Dichlorvos
72-0991
Hexachlorobutadiene
72-0820
Methyl Mercaptophos
72-1019
Thiram
72-1024
Trichlorfon
72-0825
Zineb
72-1024
Humans
Binapacryl
72-1218
DDT
72-0759 72-1091
72-1216 72-1229
Dinocap
72-1218
DNOC
72-1218
2,4-D
72-1229
Fenthion
72-1229
Lindane
72-0759 72-1216
72-1229
Organochlorines
72-0967
Organophosphates
72-0967
Integument
Mucous membranes
Animals/Experimental
BHC
72-1269
Nails/claws/horn
Human
Paraquat
72-0729
Skin
Animals/Domestic
Dichlorvos
72-0991
Animals/Experimental
Barban
72-1044
Celatox
72-1044
Chlorbufam
72-1044
Cyanuric acid
72-1017
Di-allate
72-1044
Dichloral urea
72-1044
MCPA
72-1044
Parathion
72-1307
Picloram
72-0826
Propazine
72-1044
Pyrazon
72-1044
Simazine
72-1017
TCA
72-1044
Trichloropropionitrile
72-1044
Human
Binapacryl
72-1218
Diazinon
72-0728
Dinocap
72-1218
DNOC
72-1218
Parathion
72-0728
Piperonyl butoxide
72-1227
Polychlorinated
biphenyls
72-1230
Pyrethrum
72-1227
Ziram
72-0752
Laws and Regulations
General
72-1157
Chlordane
72-0905 72-1146
Heptachlor
72-0905
Lindane
72-0905
Malathion
72-0905
Australia
BHC
72-0697
DDT
72-0697
Dieldrin
72-0697
Parathion
72-0697
Canada
DDT
72-1158
Dioxins
72-1130
2,4,5-T
72-1130
Denmark
2,4,5-T
72-0699
France
72-1139
Germany (BRD)
72-0671 72-1135
Aldrin
72-1153
DDT
72-1153
Dieldrin
72-1153
Endrin
72-1153
Heptachlor
72-1153
Mercurials
72-0700
Organochlorines
72-0700
2,4,5-T
72-1150
Germany (DDR)
DDT
72-0672
Endosulfan
72-0672
Lindane
72-0672
Parathion
72-0672
India
72-0894 72-1144
Japan
BHC
72-0673 72-0674
Carbamates
72-0903
DDT
72-0673 72-0674
Diazinon
72-0669
Fungicides
72-0668
Lindane
72-0669
Mercurials
72-0673 72-0704
Organochlorines
72-0668 72-0903
Organophasphates
72-0903

Organophosphates
72-0668
Parathion
72-0673
Netherlands
72-0726
New Zealand
Aminocarb
72-0678
BHC
72-0697
Carbaryl
72-0678
DDT
72-0697
Dieldrin
72-0697
Methiocarb
72-0678
Methomyl
72-0678
Nicotine
72-0679
Nicotine sulfate
72-0679
Parathion
72-0697
Piperonyl butoxide
72-0679
Pyrethrins
72-0679
Rotenone
72-0679
Poland
DDT
72-1140
South Africa
72-1132
Sweden
Mercurials
72-0719
United Kingdom
Arsenicals
72-1128
USA
General
Chlordane
72-1146
DDT
72-0680
2,4-D
72-1159
Herbicides
72-1163
MCPA
72-1159
Silvex
72-1159
2,4,5-T
72-1159
EPA
Aldrin
72-0902 72-1147
Amitrole
72-0684
Arsenicals
72-0684
BHC
72-1147
Chlordane
72-0684
Chloro-IPC
72-1147
DDT
72-0665 72-0902
Dicamba
72-0684
Dieldrin
72-0902 72-1147
Endrin
72-1147
IPC
72-1147
Lindane
72-1147
Mercurials
72-0684 72-0902
72-1129
Mirex
72-0902 72-1136
Picloram
72-0684
2,4,5-T
72-0684 72-0896
72-0897 72-0898
72-0902 72-1129
FDA
72-0788
Dioxins
72-1130
2,4-D
72-0681
MCPA
72-0681
Mercurials
72-0685 72-0890
Silvex
72-0681
2,4,5-T
72-0681 72-1130
USDA
Arsenicals
72-1128
Dioxins
72-1130
2,4-D
72-0681
MCPA
72-0681
Silvex
72-0681
2,4,5-T
72-0681 72-1130
USDI
Rodenticides
72-0913
States
72-0683
DDT
72-0680
Maine
Mercurials
72-1129
2,4,5-T
72-1129
Wyoming
Picloram
72-0682
Metabolism
General
General
TDE
72-1295
Absorption
Chlorphenvinphos
72-0781
Dicrotophos
72-0781
Dieldrin
72-0781
Isolan
72-0781
Monocrotophos
72-0781
Sarin
72-0781
Tetram
72-0781
Biotransformation
Aldicarb
72-0796
Aminocarb
72-0796
Aprocarb
72-0814
Banol
72-0796
Butacarb
72-0814
Carbaryl
72-0796 72-0814
Carbofuran
72-0796
Chlorpropham
72-0796
DDT
72-1011
DDT isomers
72-1011
3,5-
Diisopropylphenyl N-methylcarbamate
72-0796
3-Isopropylphenyl N-methylcarbamate
72-0796
Landrin
72-0796
Methiocarb
72-0796
Mobam
72-0796
Organophosphates
72-1280

Propham
72-0796
Propoxur
72-0796
Amphibians
General
DDT
72-1034
Dieldrin
72-1034
2,4-D
72-1034
Birds
Distribution/Storage
DDT
72-1015
DDT derived compounds
72-1015
TDE
72-1015
Cattle
Excretion
Polychlorinated biphenyls
72-1308
Chicken
General
Carbon Tetrachloride
72-1293
DDT
72-1085
Ethylene dibromide
72-1293
Polychlorinated biphenyls
72-1251
Distribution/Storage
DDT
72-0812
Dieldrin
72-0812
Heptachlor
72-0812
Lindane
72-0812 72-0834
Cow
General
Dieldrin
72-1055
Polychlorinated biphenyls
72-1063
Dog
Biotransformation
TDE
72-1076
Fish
General
Aldrin
72-1088
DDT
72-0808 72-1079
72-1088 72-1267
72-1268
Dieldrin
72-0808 72-1088
Endrin
72-1088
Methoxychlor
72-0808
Parathion
72-1274
Biotransformation
TPM
72-1080
Guinea pig
Distribution/Storage
Dieldrin
72-1026
Mercurials
72-1306
Human
General
DDT
72-0942
Absorption
BHC
72-1296
DDT
72-1296
Lindane
72-1296
Biotransformation
Aminocarb
72-1254
Carbaryl
72-1254
Methiocarb
72-1254
Zectran
72-1254
Distribution/Storage
DDT
72-1091
Mercurials
72-0704
Excretion
Pralidoxime
72-1069
In vitro
General
Aldrin
72-1081
Carbaryl
72-1081
DDT
72-1081
Dimethoate
72-1081
Fumigants
72-1081
Fungicides
72-1081
Parathion
72-1081
Simazine
72-1081
Trichlorfon
72-1081
Biotransformation
Aminocarb
72-1254
Carbaryl
72-1112 72-1254
3-Chloropropionic acid
72-0784
DDT
72-0776
Dicofol
72-0776
Dyfonate
72-1038
Methiocarb
72-1254
Parathion
72-1275
Zectran
72-1254
Lobster
General
DDT
72-1075
Mercurials
72-1075
Microorganisms
General
Atrazine
72-1001
Chlordane
72-0715
Dieldrin
72-0715
Diquat
72-1001
Diuron
72-1001
Fluometuron
72-1001
Heptachlor epoxide
72-0715
Ioxynil
72-1001
Lindane
72-0715
Linuron
72-1305
Nitralin
72-1001
Paraquat
72-1001
PCP
72-1001
Picloram
72-1001
Triallate
72-1259
Trifluralin
72-1001
Biotransformation
72-1181
Aldrin
72-1282

Atrazine
72-0816
Bux
72-0960
3-Chloropropionic acid
72-0784
DDT
72-0804
DDT derived compounds
72-1261
Dieldrin
72-1282
Endosulfan
72-1282
Endrin
72-1282
Lindane
72-0918
Prometryne
72-0816
Simazine
72-0816
Mouse
Distribution/Storage
BHC isomers
72-1300
2,4-D
72-0779
Lindane
72-1300
Parathion
72-1074
2,4,5-T
72-0779
Pheasant
General
Polychlorinated biphenyls
72-1245
Pig
Biotransformation
Dinobuton derived compounds
72-1045
DNOC
72-1045
Pigeon
Distribution/Storage
Polychlorinated biphenyls
72-1039
Plants
General
Atrazine
72-1047
Biotransformation
Aldrin
72-1057
Atrazine
72-1287
Barban
72-1058
Carbaryl
72-1112
Carbofuran
72-1059
Chlorazine
72-1287
Heptachlor
72-1057
Propazine
72-1287
Pyrazon
72-0927
Distribution/Storage
Atrazine
72-1287
Chlorazine
72-1287
Propazine
72-1287
Quail
Distribution/Storage
Polychlorinated biphenyls
72-1039
Rabbit
General
Polychlorinated biphenyls
72-0838
Absorption
BHC
72-1296
DDT
72-1296
Lindane
72-1296
Distribution/Storage
DDT
72-1091
Polychlorinated biphenyls
72-1061
Rat
General
Barban
72-1021
Captan
72-1249
Carbaryl
72-1005
Carbon Tetrachloride
72-1293
Chloro-IPC
72-1021
Dieldrin
72-1052
Dioxins
72-1262
Ethylene dibromide
72-1293
GS-14254
72-1006
IPC
72-1021
Lignisan
72-1040
Parathion
72-1066
PMA
72-1040
Proparthrin
72-1238
Biotransformation
Aldicarb
72-0796
Aminocarb
72-0796 72-1254
Atrazine
72-1047
Banol
72-0796
Carbaryl
72-0796 72-1254
Carbofuran
72-0796
Chlorpropham
72-0796
3,5-Diisopropylphenyl N-methylcarbamate
72-0796
3-Isopropylphenyl N-methylcarbamate
72-0796
Landrin
72-0796
Methiocarb
72-0796 72-1254
Mobam
72-0796
Organophosphates
72-1266
Propham
72-0796
Propoxur
72-0796
Pyrethrins
72-1050
Zectran
72-1254
Distribution/Storage
Chlordane
72-1056
Chlordane derived compounds
72-1056
DDT
72-0812
Dieldrin
72-0812 72-1026
72-1082
Heptachlor
72-0812
Lindane
72-0812
Toxaphene
72-1060

Excretion
2,4-D
72-0845
2,4,5-T
72-0845
Sheep
Biotransformation
Atrazine
72-1047
Dinobuton derived compounds
72-1045
DNOC
72-1045
Distribution/Storage
DDT derived compounds
72-1311
Excretion
DDT derived compounds
72-1311
Morbidity and Mortality Statistics
General
Kreozan
72-0988
Radosan
72-0988
Greece
Parathion
72-1219
India
Diazinon
72-0733
Japan
BHC isomers
72-1195
DDT
72-1195
DDT derived compounds
72-1195
Organochlorines
72-0965
Poland
Aldrin
72-0974
Arsenicals
72-0983
Azatox
72-0974
Cresotol
72-0974
Methyl demeton
72-0974
Zinc phosphide
72-0983
USA
72-0765
Musculoskeletal System
General
Human
Carbamates
72-0773
Organophosphates
72-0773
Muscle, smooth
Animals/Experimental
Lindane
72-0834
Muscle, striated
Animals/Experimental
Dimethoate
72-0833
Lindane
72-0834
Trichlorfon
72-0833
Human
Parathion
72-1231
Thallium
72-1231
Trichlorfon
72-0771 72-0772
Ziram
72-0732
Myocardium
In vitro
2,4-D
72-1250
Skeleton/bone
Animals/Experimental
Granosan
72-1020
Mercuran
72-1020
Mercurhexane
72-1020
Phenylmercuric bromide
72-1020
PMA
72-1020
Mutagenesis/Teratogenesis
General
Aldrin
72-0660
DDT
72-0660
Dieldrin
72-0660
Dioxins
72-1130
Polychlorinated biphenyls
72-0687
2,4,5-T
72-0660 72-1130
Animals/experimental
72-0797
Aldrin
72-0783
Arsenicals
72-1027
Captan
72-0780
2,4-DB
72-1022
Difolatan
72-0780
Dioxins
72-0787
2,4-D
72-0779
Endosulfan
72-1289
Folpet
72-0780
Mancozeb
72-1023
Maneb
72-1023
2,4,5-T
72-0779 72-0787
Zineb
72-1023
Microorganisms
Atrazine
72-0816
Prometryne
72-0816
Simazine
72-0816
Nervous System
General
Animals/Domestic
Fluor chrome arsenate phenol
72-0736
Granosan
72-0976
Animals/Experimental
Aldrin
72-1041
Carbaryl
72-0757
DDT
72-1064 72-1090
DDT isomers
72-1064
2,2-Dichlorovinyl methyl octyl phosphate
72-1010
Dichlorvos
72-0828
Dieldrin
72-1041 72-1273
Endrin
72-1041 72-1273
Lindane
72-0793
Organophosphates
72-1009 72-1266
Human
72-1228
Organochlorines
72-0967
Organophosphates
72-0967
Parathion
72-1205

Piperonyl butoxide
72-1227
Polychlorinated biphenyls
72-1230
Polychloropinene
72-0731 72-0756
Pyrethrum
72-1227
Thallium
72-0764
Trichlorfon
72-0994
In vitro
DDT
72-1067
Behavior
Animals/Experimental
Aldrin
72-0783
Organophosphates
72-1009
Paraoxon
72-0806
Parathion
72-1074
Human
DDT
72-1216
Diazinon
72-0733
Lindane
72-1216
Brain
Animals/Domestic
Granosan
72-0976
Animals/Experimental
Atrazine
72-1309
BHC
72-1296
Crimidine
72-1271
DDT
72-0812 72-1296
DFP
72-0775
Dieldrin
72-0812
Formothion
72-1277
Heptachlor
72-0812
Lindane
72-0812 72-1296
Maneb
72-0822
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
NC 250
72-1297
PMA
72-0791
Sarin
72-0777
Sodium fluoroacetate
72-0815
Human
ANTU
72-0755
DDT
72-0755 72-1210
Organophosphates
72-1210
Trichlorfon
72-0755
Zinc phosphide
72-0755
Zoocoumarin
72-0755
In vitro
Allethrin
72-1078
DDT
72-1078
Polychlorinated biphenyls
72-1077
Soman
72-1068
Wildlife
DDT
72-0808
Dieldrin
72-0808
Methoxychlor
72-0808
Convulsions
Animals/Experimental
DDT
72-1015
DDT derived compounds
72-1015
Pyrethrins
72-1279
TDE
72-1015
Demyelination
Animals/Experimental
DFP
72-1285 72-1286
EEG
Animals/Experimental
Dibam
72-1239
Sodium fluoroacetate
72-0815
Human
Anthraquinone
72-0985
ANTU
72-0985
Chloralose
72-0985
Warfarin
72-0985
Parasympathetic nerves
Human
Carbamates
72-0773
Organophosphates
72-0773
Peripheral nerves
Animals/Domestic
Granosan
72-0770
Animals/Experimental
DFP
72-1285
Dimethoate
72-0833
Malathion
72-1049
Mancozeb
72-1023
Maneb
72-1023
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
Trichlorfon
72-0833
Zineb
72-1023
Human
ANTU
72-0755
Arsenicals
72-1233
BHC
72-0970
DDT
72-0755 72-1210
Fungicides
72-1233
Lead
72-1233
Organophosphates
72-1210 72-1217
Polychlorinated biphenyls
72-0990
Thallium
72-1233
Trichlorfon
72-0755 72-0771
72-0772
Tri-o-cresyl phosphate
72-0989
Zinc phosphide
72-0755
Zoocoumarin
72-0755
In vitro
Pyrethrins
72-1279
Polyneuritis
Human
ANTU
72-0755

DDT
72-0755 72-1216
Diazinon
72-1206
Dichlorvos
72-1206
Fenitrothion
72-1206
Lindane
72-1216
Polychlorinated biphenyls
72-0990
Trichlorfon
72-0755 72-0771
Zinc phosphide
72-0755
Zoocoumarin
72-0755
Spinal cord
Animals/Experimental
Malathion
72-1049
Human
ANTU
72-0755
DDT
72-0755
Trichlorfon
72-0755
Zinc phosphide
72-0755
Zoocoumarin
72-0755
Sympathetic nerves
Human
Carbamates
72-0773
Organophosphates
72-0773
New Journals
72-0908
Nomenclature
72-0895
Mercurials
72-0685
Organophosphates
72-1281
Photodecomposition
72-0667
Aldrin
72-1191
Amitrole
72-0720
Atrazine
72-0716
Dalapon
72-0720
DDT
72-0706
2,4-derived compounds
72-0720
Dichlobenil
72-0720
Dieldrin
72-1191
Diquat
72-0720
Diuron
72-1171
2,4-D
72-0720
Endosulfan
72-1191
MPA
72-0706
Organochlorines
72-1349
Pyrethrins
72-0664
SD 15418
72-0716
TCA
72-0720
Triphenyltin
72-1204
Prevention
General
72-0676 72-0683
72-0744 72-0973
72-0984 72-0993
72-1211
Arsenicals
72-1189
Azinphosmethyl
72-0741
Calcium cyanide
72-1138
DDT
72-0986
Diazinon
72-0741
DNOC
72-1025
Hexachlorobutadiene
72-0820
Hydrogen cyanide
72-1180
Lindane
72-0986
Malathion
72-0741
Mercurials
72-0700
Methyl bromide
72-1179
Methyl demeton
72-0741
Nitro compounds
72-0987
Organochlorines
72-0700 72-0981
72-0982 72-0987
Organophosphates
72-0981 72-0982
72-0987
Parathion
72-0741
Petroleum oils
72-1138
Phosphamidon
72-0741
Phosphine
72-1179
Tri-o-cresyl phosphate
72-0989
Zineb
72-0760
Decontamination
Dicofol
72-1167
Dicofol derived compounds
72-1167
Disposal
72-0746 72-0747
72-0748 72-0749
72-0750 72-1235
Carbamates
72-0745
Organochlorines
72-0745
Organophosphates
72-0745
Protective equipment
72-0969
Paraquat
72-0729
Resiston
72-0998
Safe packaging
Phosphine
72-0957
Picloram
72-0682
Storage and transportation
BHC
72-0940
DDT
72-0940
Endrin
72-0975
Hexachlorobenzene
72-0975
Polychloropinene
72-0940
Reproduction/Growth
General
Animals/Experimental
Azinphosmethyl
72-1288
Carbaryl
72-1016
2,4-DB
72-1022
DDT
72-0827 72-1085
Granosan
72-1020
Lindane
72-0827

Mercuran
72-1020
Mercurhexane
72-1020
NC 250
72-1298
Phenylmercuric bromide
72-1020
PMA
72-1020
Microorganisms
Atrazine
72-1001
Diquat
72-1001
Diuron
72-1001
Fluometuron
72-1001
Ioxynil
72-1001
Nitralin
72-1001
Paraquat
72-1001
PCP
72-1001
Picloram
72-1001
Trifluralin
72-1001
Wildlife
2,4-D
72-1213
Eggshell effects
Animals/Experimental
DDT
72-1257
Dieldrin
72-1257
Dimethoate
72-0833
Trichlorfon
72-0833
Wildlife
BHC isomers
72-0947
DDT
72-0762 72-0810
72-1173 72-1187
DDT derived compounds
72-0810 72-0947
72-0972 72-1173
72-1187
Dieldrin
72-0810 72-0947
72-1187
Heptachlor epoxide
72-0947 72-1187
Organochlorines
72-0947
Polychlorinated biphenyls
72-0687 72-0947
72-1173 72-1187
TDE
72-1187
Embryo/fetus
Animals/Domestic
Aldrin
72-1209
Carbaryl
72-1209
Crotoxyphos
72-1209
DDT
72-1209
Diazinon
72-1209
Dichlorvos
72-1209
Dieldrin
72-1209
Heptachlor epoxide
72-1209
Lindane
72-1209
Methoxychlor
72-1209
Animals/Experimental
72-0797
Atrazine
72-1310
DDT
72-1086
DFP
72-1031
2,4-Dinitrophenol
72-1248
Dioxins
72-0787
2,4-D
72-0779 72-1310
Endosulfan
72-1289
Mancozeb
72-1023
Maneb
72-1023
Parathion
72-0789
Polychlorinated biphenyls
72-0838 72-0839
2,4,5-T
72-0779 72-0787
72-1086
Zineb
72-1023
Human
Polychlorinated biphenyls
72-1230
Estrogens
Animals/Experimental
DDT derived compounds
72-1311
Human
TDE
72-1033
Gametogenesis
Animals/Experimental
Endosulfan
72-1289
Microorganisms
Atrazine
72-0816
Prometryne
72-0816
Simazine
72-0816
Growth
DNOC
72-0824
Animals/Experimental
Carbaryl
72-1247
DDT
72-1015 72-1042
DDT derived compounds
72-1015
Dieldrin
72-1247
Endrin
72-1042
Lindane
72-0793 72-1042
TDE
72-1015
Microorganisms
Allyl alcohol
72-1283
Atrazine
72-0816
Dazomet
72-1283
DDT derived compounds
72-1261
Formaldehyde
72-1283
Metham
72-1283
Prometryne
72-0816
Simazine
72-0816
Sodium ethylxanthogenate
72-1284
Trichlorophenol
72-1284
Hormones
Animals/Experimental
Dieldrin
72-1083
Paraoxon
72-1092

Human
Aldrin
72-1344
Dieldrin
72-1344
Endrin
72-1344
In vitro
Dieldrin
72-1083
Neonate
Mercurials
72-0719
Placental transfer
Mercurials
72-0719
Animals/Experimental
DDT
72-1086 72-1090
Dieldrin
72-1026
2,4-D
72-0779
Parathion
72-1062
Polychlorinated biphenyls
72-0838 72-1061
2,4,5-T
72-0779 72-1086
Human
Aldrin
72-1188
DDT
72-1188
Dieldrin
72-1188
Lindane
72-1188
Organophosphates
72-1188
TDE
72-1188
Reproductive organs, female
Animals/Experimental
Atrazine
72-1309
Endosulfan
72-1289
Reproductive organs, male
Animals/Experimental
Endosulfan
72-1289
Maneb
72-0831
In vitro
Dieldrin
72-1083
Residue Degradation
General
72-0746
Aldrin
72-1191
BHC isomers
72-0692 72-0694
DDT
72-0692 72-0702
72-1011
DDT derived compounds
72-0702
DDT isomers
72-1011
Dieldrin
72-1191
Endosulfan
72-1191
Lindane
72-0692 72-0694
Food and Feed
72-0726
Aldrin
72-0954
Carbamates
72-0953
Dieldrin
72-0919 72-0954
Endrin
72-0954
Granosan
72-0724
Heptachlor
72-0954
Lindane
72-0834 72-0954
Organochlorines
72-0953
Organophosphates
72-0953
Trichlorfon
72-0725
Soil
72-0667 72-0901
Atrazine
72-0716 72-0928
Butylate
72-1170
Bux
72-0960
DDT
72-0804 72-0955
2,4-D
72-0926
Lindane
72-0918
PCP
72-0727
SD 15418
72-0716
Toxaphene
72-0951
Water
Aldicarb
72-0717
Amitrole
72-0720
Carbaryl
72-0701 72-0717
Carbofuran
72-0717
Dalapon
72-0720
DDT
72-0717
2,4-derived compounds
72-0720
Dichlobenil
72-0720
Dimetilan
72-0701
Diquat
72-0720
Diuron
72-1171
2,4-D
72-0720
Formparanate
72-0717
Herbicides
72-1163
Mobam
72-0717
Propoxur
72-0701
72-0717
Pyrolan
72-0701
TCA
72-0720
Wildlife
Aldicarb
72-0717
Carbaryl
72-0717
Carbofuran
72-0717
DDT
72-0717
Formparanate
72-0717
Mobam
72-0717
Propoxur
72-0717
Residue Dynamics
72-1165
BHC isomers
72-0694
DDT
72-1164
2,4-D
72-0926
Lindane
72-0694
Mercurials
72-0718
Polychlorinated biphenyls
72-1164
Sodium chlorate
72-1328

Residue Removal
General
72-0748 72-0749
72-0750
DDT
72-1169
Food and Feed
Arsenicals
72-0963
DDT
72-1145
Dicofol
72-1167
Dicofol derived compounds
72-1167
Fenitrothion
72-0963
Lead
72-0963
Phenthoate
72-0963
Water
Aldrin
72-1172
DDT
72-1164 72-1172
Dieldrin
72-0714 72-1172
Diuron
72-1171
Endrin
72-0938
Lindane
72-1172
Polychlorinated biphenyls
72-1164
Strychnine
72-0938
Residue/Air
General
72-0747 72-1176
Acrofol
72-1100
Allethrin
72-1166
BHC
72-1296
BHC isomers
72-0692
Calcium chlorate-chloride
72-1100
CPAS
72-1097
DDT
72-0692 72-1296
Dichlorodiphenyletha
72-1097
Lindane
72-0692 72-1296
Magnesium chlorate-chloride
72-1100
Maneb
72-0753
Menazon
72-1099
Toxaphene
72-0951
Ziram
72-0752
Indoors
BHC
72-1203
DDT
72-1203
Methyl mercaptophos
72-1203
Thiometon
72-1203
Rural
DEF
72-0968
Methyl Mercaptophos
72-0968
Urban
Aldrin
72-0688
BHC isomers
72-0688
DDT
72-0688
DDT derived compounds
72-0688
Dieldrin
72-0688
Lindane
72-0688
Residues/Domestic Animals
General
BHC isomers
72-0694
Lindane
72-0694
Bees
Carbaryl
72-0887
Chicken
Granosan
72-0724 72-0770
Cow
Aldrin
72-1209
Carbaryl
72-0722 72-1209
Crotoxyphos
72-1209
DDT
72-1168 72-1169
72-1209
Diazinon
72-1209
Dichlorvos
72-1209
Dicresyl
72-0722
Dieldrin
72-1168 72-1209
Heptachlor epoxide
72-1209
Lindane
72-1209
Methoxychlor
72-1209
Trichlorfon
72-0832
Pig
Granosan
72-0724
Residues/Food and Feed
General
72-0894 72-0900
72-0907 72-1144
72-1194
BHC
72-0674 72-0697
72-0870 72-0940
Conen
72-0961
DDT
72-0672 72-0674
72-0697 72-0703
72-0870 72-0940
72-1140 72-1145
DEF
72-0835
Dieldrin
72-0697 72-0703
Diquat
72-0696
Endosulfan
72-0672
Estox
72-0961
Ethylene oxide
72-0696
Fenitrothion
72-0961
Fenthion
72-0961
Granosan
72-0770
Heptachlor derived compounds
72-0956
Hinosan
72-0961
Inezin
72-0961
Kitazin-P
72-0961
Lindane
72-0672 72-0703
Malathion
72-0961
Mercurials
72-0691 72-0704
Morfamquat
72-0696
Organochlorines
72-0691

Organophosphates
72-0691 72-0868
Oxydemeton methyl
72-0835
Parathion
72-0672 72-0696
72-0697 72-0961
Phosphine
72-0696
Polychlorinated
biphenyls
72-1148
Polychloropinene
72-0940
Sulfur dioxide
72-0823
2,4,5-T
72-0699
Alfalfa
Chlorpropham
72-1114
Phosalone
72-0949
Animal feed
Arsenicals
72-0937
DDT
72-0937 72-1168
DDT derived
compounds
72-0937
Dicofol
72-1167
Dicofol derived
compounds
72-1167
Dieldrin
72-1168
Apples
DDT
72-1168
Dicofol
72-1167
Dicofol derived
compounds
72-1167
Dieldrin
72-1168
Phosalone
72-0949
Apricots
Carbamates
72-0953
Organochlorines
72-0953
Organophosphates
72-0953
Beets
EPTC
72-0869
Pebulate
72-0869
Polychloropinene
72-1278
Beets, Sugar
Pyrazon
72-0927
Toxaphene
72-0951
Cabbage, Chinese
Arsenicals
72-0962
Lead
72-0962
Lindane
72-0962
Cereals
DDT
72-0843
DDT derived
compounds
72-0843
Lindane
72-0843
Phosphine
72-0957
Chicken
Aldrin
72-0954
Dieldrin
72-0954
Endrin
72-0954
Heptachlor
72-0954
Lindane
72-0954
Polychlorinated
biphenyls
72-1148
Trichlorfon
72-0725
Citrus
Organophosphates
72-1104
Corn
DDT
72-0923
Lindane
72-0923
Cucumbers
Dicofol
72-1339
Dairy products
Aldrin
72-0943 72-1209
BHC
72-0673 72-0943
72-0950
Carbaryl
72-0924 72-1209
Crotoxyphos
72-1209
DDT
72-0673 72-0698
72-0950 72-1209
DDT derived
compounds
72-0698 72-0943
Diazinon
72-1209
Dichlorvos
72-0921 72-1209
Dieldrin
72-0698 72-0742
72-0943 72-1209
Endrin
72-0742 72-0943
Granosan
72-0884
Heptachlor
72-0943
Heptachlor epoxide
72-0943 72-1209
Hexachlorobenzene
72-0930
Imidan
72-0886
Lindane
72-0943 72-1209
Malathion
72-0924 72-0925
Mercurials
72-0673 72-0884
Methoxychlor
72-1209
Organochlorines
72-0711
Organophosphates
72-0711
Parathion
72-0673
PCNB
72-0930
Polychlorinated
biphenyls
72-0698 72-1063
72-1308
Ronnel
72-0924 72-0925
TDE
72-0943
Trichlorfon
72-0921
Eggs
DDT
72-1183
DDT derived
compounds
72-1183
Dimethoate
72-0833
Trichlorfon
72-0725
72-0833
Endive
Hexachlorobenzene
72-0930
PCNB
72-0930
Fish
Mercurials
72-0710

Flour
Endrin
72-0975
Hexachlorobenzene
72-0975
Fruits
BHC
72-1196
Carbamates
72-1196
Carbaryl
72-0924
DDT
72-1196
Malathion
72-0924 72-1196
Parathion
72-1196
Ronnel
72-0924
Grain
Hydrogen cyanide
72-1180
Methyl bromide
72-1179
Phosphine
72-1179
Herbs
2,4-D
72-0945
Honey
Carbaryl
72-0887
Meat
Aldrin
72-0874
BHC
72-0950
DDT
72-0950
Granosan
72-0724
Imidan
72-0886
Milk
BHC
72-0844
Carbaryl
72-0722
DDT
72-0844
DDT derived compounds
72-0844
Dicresyl
72-0722
Oats
Phosphine
72-0958
Zinc phosphide
72-0958
Oils
Methyl bromide
72-1185
Polychlorinated biphenyls
72-1230
Onions
Carbamates
72-0934
Dacthal
72-0934
Herbicides
72-0934
Organochlorines
72-0934
Organophosphates
72-0934
Oranges
Thiabendazole
72-0859
Pork
Dieldrin
72-0919
Potatoes
EPTC
72-0869
Pebulate
72-0869
Polychloropinene
72-1278
Rice
BHC
72-0693
Conen
72-0961
Estox
72-0961
Fenitrothion
72-0961
Fenthion
72-0961
Hinosan
72-0961
Inezin
72-0961
Kitazin-P
72-0961
Lindane
72-0693
Malathion
72-0961
Parathion
72-0961
Silvex
72-1093
Soybeans
Dieldrin
72-1174
Heptachlor
72-1174
Spinach
Carbamates
72-0953
Organochlorines
72-0953
Organophosphates
72-0953
Strawberries
Chlormequat Chloride
72-0939
Sugar
Phosphine
72-0958
Zinc phosphide
72-0958
Sunflower Seeds
Mercurials
72-1000
Sweet potatoes
Organochlorines
72-0933
Tomatoes
Chlormequat Chloride
72-0939
Total diet
72-0726 72-0931
72-0932
Aldrin
72-1198
Arsenicals
72-1198
BHC
72-1198 72-1199
BHC isomers
72-0694 72-1197
DDT
72-1193 72-1198
72-1199
Dieldrin
72-1193 72-1198
72-1199
Endrin
72-1198
Heptachlor
72-1193
Lead
72-1198
Lindane
72-0694 72-1197
72-1198
Mercurials
72-0691
Organochlorines
72-0691
Organophosphates
72-0691
Parathion
72-1198
Vegetables
BHC
72-0693 72-1196
Carbamates
72-1196
DDT
72-1196
Lindane
72-0693
Malathion
72-1196
Parathion
72-1196

Residues/Humans
General
Aldrin
72-1188
BHC
72-0674
BHC isomers
72-0694
DDT
72-0674 72-0920
72-1188
DDT derived compounds
72-0920
DDT isomers
72-0920
Dieldrin
72-1188
Heptachlor derived compounds
72-0956
Lead
72-0910
Lindane
72-0694 72-0920
72-1188
Mercurials
72-0710 72-0906
Organochlorines
72-0707 72-0906
72-1226
Organophosphates
72-1188 72-1226
TDE
72-0920 72-1188
Ziram
72-0752
Adipose
BHC isomers
72-1202
DDT
72-0689 72-0703
72-0942 72-1145
72-1177 72-1202
72-1216
DDT derived compounds
72-0689 72-1202
DDT isomers
72-1202
Dieldrin
72-0703 72-1202
Heptachlor epoxide
72-1202
Lindane
72-0703 72-1202
72-1216
Blood
BHC
72-0946
BHC isomers
72-1195
DDT
72-0946 72-1195
DDT derived compounds
72-0946 72-1195
Dieldrin
72-0946
Fenitrothion
72-1192
Heptachlor epoxide
72-0946
Lindane
72-0946
Malathion
72-1192
Parathion
72-1192
Salithion
72-1192
Milk
Aldrin
72-1198
Arsenicals
72-1198
BHC
72-0673 72-1198
72-1199
BHC isomers
72-0694 72-1197
DDT
72-0673 72-0689
72-1161 72-1198
72-1199
DDT derived compounds
72-0689
Dieldrin
72-1198 72-1199
Endrin
72-1198
Lead
72-1198
Lindane
72-0694 72-1197
72-1198
Mercurials
72-0673
Parathion
72-0673 72-1198
Organs
Binapacryl
72-1218
DDT
72-0942
Dinocap
72-1218
DNOC
72-1218
Mercurials
72-0704
Urine
Arsenicals
72-1189
Carbamates
72-0773
Chlorfenvinphos
72-1338
DDT derived compounds
72-1232
Diquat
72-0696
2,4-D
72-0845
EPN
72-1212
Ethylene oxide
72-0696
Morfamquat
72-0696
Organophosphates
72-0773
Parathion
72-0696 72-1208
72-1212
Phosphine
72-0696
2,4,5-T
72-0845
Residues/Plants
General
BHC
72-0950
DDT
72-0950
Organophosphates
72-0868
Polychlorinated biphenyls
72-0687
Algae
Aldicarb
72-0717
Carbaryl
72-0717
Carbofuran
72-0717
DDT
72-0717
Formparanate
72-0717
Mobam
72-0717
Propoxur
72-0717
Carnations
Benomyl
72-1348
Residues/Soil
BHC
72-0950
DDT
72-0950
Tobacco
BHC
72-1201
DDT
72-0920 72-1201
DDT derived compounds
72-0920

DDT isomers
72-0920
Endosulfan
72-1096
Endosulfan derived compounds
72-1096
Lindane
72-0920 72-1201
TDE
72-0920

Residues/Soil
General
72-1144 72-1181
Aldrin
72-0713
Atrazine
72-0816 72-1190
Benthiocarb
72-0840
BHC
72-0674 72-0940
BHC isomers
72-0692
Butylate
72-1170
Carbamates
72-0934
CPAS
72-1097
Dacthal
72-0934
DDT
72-0674 72-0692
72-0940
Dichlorodiphenylethane
72-1097
Dieldrin
72-0713
2,4-D
72-0926
Endrin
72-0713
Heptachlor derived compounds
72-0956
Heptachlor epoxide
72-1118
Herbicides
72-0934
Lindane
72-0692 72-0713
Mercurials
72-0704 72-0922
Organochlorines
72-0933 72-0934
Organophosphates
72-0868 72-0934
Paraquat
72-1190
Polychloropinene
72-0940
Prometryne
72-0816
Simazine
72-0816
Toxaphene
72-0713
Adsorption
Atratone
72-0944
Atrazine
72-0716 72-0877
72-0928 72-0944
BHC
72-0693
Diuron
72-0877
Lindane
72-0693
SD 15418
72-0716
Simazine
72-0944
Movement
Aldrin
72-1186
BHC
72-0952
Chlordecon
72-0690
DDT
72-1186
Dieldrin
72-1186
Dyfonate
72-0690
Endrin
72-0690
PP 211
72-0690

Residues/Water
General
72-0670 72-1234
Aldicarb
72-0717
Aldrin
72-1178 72-1186
Amitrole
72-0720 72-1265
BHC
72-0674
BHC isomers
72-0692
Carbaryl
72-0717
Carbofuran
72-0717
Chlordane
72-0715
CPAS
72-1097
Dalapon
72-0720 72-1265
DDT
72-0674 72-0692
72-0708 72-0717
72-0909 72-1164
72-1186
2,4-derived compounds
72-0720
Detox
72-1178
Dibromochloropropane
72-0751
Dichlobenil
72-0720 72-0936
72-1265
Dichlorodiphenylethane
72-1097
Dieldrin
72-0708 72-0715
72-1186
Dinoseb
72-1178
Diplitox
72-1178
Diquat
72-0720
Diuron
72-1265
DNOC
72-0872
Duplitox
72-1178
2,4-D
72-0720
Ekatox
72-1178
Fenitrothion
72-0885
Formparanate
72-0717
Fungicides
72-1152
Heklotox
72-1178
Heptachlor epoxide
72-0708 72-0715
Herbicides
72-0721 72-1152
72-1163 72-1182
Hexa
72-1182
Lindane
72-0692 72-0708
72-0715
Menazon
72-0873
Mercurials
72-0691 72-0700
72-0718 72-0719
72-0890 72-1152
72-1200
Methoxychlor
72-0708
Mobam
72-0717
Organochlorines
72-0691 72-0700
72-0909 72-0948
72-1152 72-1182

Organophosphates
72-0691 72-1182
Paraquat
72-1265
Polychlorinated biphenyls
72-1149 72-1164
Propoxur
72-0717
TCA
72-0720
Estuaries
Polychlorinated biphenyls
72-1246
Groundwater
Aldrin
72-0713
Dieldrin
72-0713
Endrin
72-0713
Lindane
72-0713
Toxaphene
72-0713
Lakes
DDT
72-0709
Endrin
72-0938
Strychnine
72-0938
Oceans
DDT
72-0661
Rivers
DDT
72-0703
Dieldrin
72-0703 72-0714
2,4-D
72-0743
Lindane
72-0703
Residues/Wildlife
General
72-1165
BHC isomers
72-0694
DDT
72-1184
DDT derived compounds
72-1184
Lindane
72-0694
Mercurials
72-0719
Polychlorinated biphenyls
72-0687 72-1184
Birds
BHC isomers
72-0947
DDT
72-1187
DDT derived compounds
72-0947 72-1187
Dieldrin
72-0947 72-1187
Heptachlor epoxide
72-0947 72-1187
Organochlorines
72-0947
Polychlorinated biphenyls
72-0947 72-1187
TDE
72-1187
Eggs
BHC isomers
72-0947
DDT
72-1173 72-1187
DDT derived compounds
72-0712 72-0947
72-0972 72-1173
72-1175 72-1187
Dieldrin
72-0712 72-0947
72-1187
Heptachlor epoxide
72-0712 72-0947
72-1187
Organochlorines
72-0947
Polychlorinated biphenyls
72-0947 72-1173
72-1175 72-1187
TDE
72-1187
Fish/aquatic/marine life
72-0670
Aldicarb
72-0717
Carbaryl
72-0717
Carbofuran
72-0717
DDT
72-0661 72-0703
72-0705 72-0717
72-0909 72-0929
72-1164
DDT derived compounds
72-0705 72-0929
DDT isomers
72-0929
Dieldrin
72-0703
2,4-D
72-0743
Formparanate
72-0717
Heptachlor derived compounds
72-0956
Lead
72-0935
Lindane
72-0703
Malathion
72-0847
Mercurials
72-0695 72-0700
72-0710 72-0718
72-1200
Mobam
72-0717
Organochlorines
72-0700 72-0847
72-0909
72-0948
Parathion
72-0847
Polychlorinated biphenyls
72-0847 72-0929
72-1164
Propoxur
72-0717
TDE
72-0705
Mammals
DDT
72-0705
DDT derived compounds
72-0705
TDE
72-0705
Respiratory System
General
Animals/Domestic
ANTU
72-0738
Animals/Experimental
72-1102
BHC
72-1296
DDT
72-1296
Lindane
72-1296
NC 250
72-1298
Human
BHC
72-1296
DDT
72-1296
Hydrogen cyanide
72-0769
Lindane
72-1296
Parathion
72-1219

Apnea
Animals/Experimental
Dichlorvos
72-1304
Thiabendazole
72-1304
Triamiphos
72-0803
Trichlorfon
72-1304
Dyspnea
Human
Binapacryl
72-1218
Dinocap
72-1218
DNOC
72-1218
Organophosphates
72-1217
Gills
In vitro
DDT
72-1070
Wildlife
DDT
72-0808
Dieldrin
72-0808
Methoxychlor
72-0808
Hyperpnea
Human
Hydrogen cyanide
72-0767
Lung
Animals/Experimental
Atrazine
72-1309
BHC
72-1296
DDT
72-1296
Dichlorvos
72-0828
Dicresyl
72-0836
Lindane
72-0834 72-1296
Mancozeb
72-1023
Maneb
72-0822 72-1023
2-Methyl-1-naphthyl
N-methyl carbamate
72-0837
Monuron
72-0805
Paraquat
72-1222 72-1223
Zineb
72-1023
Human
72-0984
Organophosphates
72-1217
Parathion
72-1205
Polypnea
Human
BHC
72-0970
Upper respiratory tract
Animals/Experimental
BHC
72-1269
Mancozeb
72-1023
Maneb
72-1023
Zineb
72-1023
Human
72-0984
Demeton
72-0766
Methyl demeton
72-0766
Zineb
72-0760
Ziram
72-0752
Reviews
72-1181 72-1220
72-1234 72-1236
Aldicarb
72-0796
Aldrin
72-1153
Aminocarb
72-0796
Arsenicals
72-0992 72-1128
Atrazine
72-1287
Banol
72-0796
Carbamates
72-0795
Carbaryl
72-0796
Carbofuran
72-0796
Chlorazine
72-1287
Chlorphenvinphos
72-0781
Chlorpropham
72-0796
DDT
72-0662 72-1127
72-1153 72-1193
Dicrotophos
72-0781
Dieldrin
72-0781 72-1153
72-1193
3,5-
Diisopropylphenyl N-
methylcarbamate
72-0796
Endrin
72-1153
Heptachlor
72-1153 72-1193
Herbicides
72-0662 72-0889
Hexachlorobenzene
72-1263
Hydrogen cyanide
72-1180
Isolan
72-0781
3-Isopropylphenyl N-
methylcarbamate
72-0796
Landrin
72-0796
Malathion
72-1332
Mercurials
72-0719 72-0906
72-0922
Methiocarb
72-0796
Methyl bromide
72-1179
Mobam
72-0796
Monocrotophos
72-0781
Organochlorines
72-0876 72-0906
72-0948 72-0981
Organophosphates
72-0795 72-0876
72-0981 72-0982
72-0992 72-1009
72-1221 72-1266
72-1281
Parathion
72-1205
Phosphine
72-1179
Propazine
72-1287
Propham
72-0796
Propoxur
72-0796
Pyrethrins
72-1160
Rodenticides
72-0992
Sarin
72-0781
Tetram
72-0781
2,4,5-T
72-1150

Sensory System
Hearing
Human
72-0969
Demeton
72-0766
Methyl demeton
72-0766
Vision
Animals/Experimental
DDT
72-1090
DFP
72-0730
Dichloran
72-0730 72-0798
Diquat
72-0730
Fenitrothion
72-1207
Heptachlor
72-0730
Malathion
72-1207
Paraoxon
72-0730
Paraquat
72-0730
Parathion
72-0730
Picloram
72-0826
Sarin
72-0802
Soman
72-0802
Thallium
72-0730
Thiometon
72-1207
Human
Carbamates
72-0773
DFP
72-0730
Diazinon
72-1206
Dichloran
72-0730
Dichlorvos
72-1206
Diquat
72-0730
EPN
72-1212
Fenitrothion
72-1206 72-1207
Heptachlor
72-0730
Malathion
72-1207
Organophosphates
72-0773
Paraoxon
72-0730
Paraquat
72-0730
Parathion
72-0730 72-1212
Piperonyl butoxide
72-1227
Pyrethrum
72-1227
Thallium
72-0730
Thiometon
72-1207
Ziram
72-0752
Therapeutic use
Cancer
TDE
72-0768 72-1033
72-1291
Cushing's syndrome
TDE
72-0737 72-0763
Ehrlich ascites tumors
2,4-D
72-1048
2,4,5-T
72-1048
Toxicity/Domestic Animals
General
Arsenicals
72-0983 72-0992
2,4-D
72-0743
Organochlorines
72-0992
Organophosphates
72-0992
Rodenticides
72-0992
Zinc phosphide
72-0983
Chicken
Granosan
72-0770
Cow
Aldrin
72-1209
Carbaryl
72-1209
Crotoxyphos
72-1209
Cyolane
72-0999
DDT
72-1209
Diazinon
72-1209
Dichlorvos
72-1209
Dieldrin
72-1209
Fluor chrome
arsenate phenol
72-0736
Granosan
72-0976
Heptachlor epoxide
72-1209
Lindane
72-1209
Methoxychlor
72-1209
alpha-Naphthyl
isothiocyanate
72-1013
Dog
ANTU
72-0738
Dichlorvos
72-0991
Strychnine
72-1214
Pig
Granosan
72-0976
Warfarin
72-1215
Sheep
alpha-Naphthyl
isothiocyanate
72-1013
Toxicity/Experimental Animals
BHC Isomers
72-0801
DDT
72-1034
Dieldrin
72-1034
2,4-D
72-1034
General
72-1008
BHC
72-0792
Carbaryl
72-0757
Chlordane
72-1146
DDT
72-0792
EPN
72-0792
Fenitrothion
72-0792
Hydrogen cyanide
72-1180
Malathion
72-0792
Methyl bromide
72-1179
Organophosphates
72-1280 72-1281
Phosphine
72-1179
Birds
Abate
72-1244

Azinphosmethyl
72-1288
Bromophos
72-1244
DDT
72-1015 72-1244
DDT derived compounds
72-1015
Gardona
72-1244
TDE
72-1015
Cat
DFP
72-1285
Formothion
72-1277
Hexachlorobutadiene
72-0820
Maneb
72-0822
Schradan
72-0782
Chicken
Antidotes
72-1256
Carbon Tetrachloride
72-1293
DDT
72-0812
DFP
72-1031 72-1286
Dichlorvos
72-0828
Dieldrin
72-0812
Dimethoate
72-0833
2,4-D
72-1292
Endosulfan
72-1289
Ethylene dibromide
72-1293
Heptachlor
72-0812
Lindane
72-0812 72-0834
2-Methyl-1-naphthyl N-methyl carbamate
72-0837
Parathion
72-0789
Polychlorinated biphenyls
72-1251
Trichlorfon
72-0833 72-1256
2,4,5-T
72-1292
Cow
Aldrin
72-1209
Carbaryl
72-1209
Chorfenvinphos
72-1303
Crotoxyphos
72-1209 72-1303
DDT
72-1209
Delnav
72-1303
Diazinon
72-1209
Dichlorvos
72-1209
Dieldrin
72-1209
Famphur
72-1303
Heptachlor epoxide
72-1209
Lindane
72-1209
Methoxychlor
72-1209
Sulfur dioxide
72-0823
Crab
Carbaryl
72-1247
Dieldrin
72-1247
Crayfish
Pyrethrins
72-1279
Dog
Dichloran
72-0798
Dieldrin
72-1273
Endrin
72-1273
Fenitrothion
72-1207
Malathion
72-1207
Thiometon
72-1207
Fish
Amitrole
72-1265
Dalapon
72-1265
DDT
72-0808 72-1070
Dichlobenil
72-1265
Dieldrin
72-0808
2,4-Dinitrophenol
72-1248
Diuron
72-1265
Malathion
72-1049
Methoxychlor
72-0808
72-1018
Paraquat
72-1265
Parathion
72-1274
Frog
Pyrethrins
72-1279
Guinea Pig
Barban
72-1044
Celatox
72-1044
Chlorbufam
72-1044
Di-allate
72-1044
Dichloral urea
72-1044
MCPA
72-1044
Parathion
72-1307
Propazine
72-1044
Pyrazon
72-1044
Sarin
72-0802
Soman
72-0802
TCA
72-1044
Trichloropropionitri
72-1044
Hamster
Aldrin
72-0807
Chlordane
72-0807
DDT
72-0807
Dieldrin
72-0807
Endosulfan
72-0807
Heptachlor
72-0807
Lindane
72-0807
Horse
2,2-Dichlorovinyl methyl octyl phosphate
72-1010
Dichlorvos
72-1304
Thiabendazole
72-1304
Trichlorfon
72-1304

Monkey
DDT
72-0786 72-1090
72-1253
Lindane
72-0786
PMA
72-0791
Mouse
Aldrin
72-0783
BHC
72-1299
BHC isomers
72-1300
Captan
72-0780
Carbaryl
72-1072
Carbaryl derived compounds
72-1072
Chlorfenvinphos
72-0790 72-1301
Crimidine
72-1271
Crotoxyphos
72-0790 72-1301
DDT
72-0776 72-1299
Dichlorvos
72-0790 72-1299
72-1301
Dicofol
72-0776
Dicrotophos
72-0790 72-1301
Dieldrin
72-1273
Difolatan
72-0780
Dioxins
72-0787
Endrin
72-1273
Fenitrothion
72-1299
Folpet
72-0780
Formothion
72-1277
Granosan
72-0724 72-1020
Hexachlorobutadiene
72-0820
Lindane
72-1300
Malathion
72-1299
Mercuran
72-1020
Mercurhexane
72-1020
Methyl bromide
72-0821
Mevinphos
72-0790 72-1301
Monocrotophos
72-0790 72-1301
Monuron
72-0805
NC 250
72-1297 72-1298
Paraoxon
72-0790 72-1301
Parathion
72-0790 72-1074
72-1299 72-1301
PCP
72-1299
Phenylmercuric bromide
72-1020
Picloram
72-0826
PMA
72-1020
Soman
72-1252
Thiram
72-1240
Tri-o-cresyl phosphate derived compounds
72-1252
Tri-o-cresyl phosphate
72-1252
2,4,5-T
72-0787
Pig
Dichloran
72-0798
Quail
Endosulfan
72-1289
Rabbit
Barban
72-1044
BHC
72-1269
Captan
72-0780
Carbaryl
72-0817 72-1024
Celatox
72-1044
Chlorbufam
72-1044
DDT
72-1024 72-1042
72-1086 72-1091
DEF
72-0835
Di-allate
72-1044
Dichloral urea
72-1044
Difolatan
72-0780
Endrin
72-1042
Folpet
72-0780
Lindane
72-0793 72-1042
MCPA
72-1044
Methyl bromide
72-0821
NC 250
72-1297
Ovex
72-0809
Oxydemeton methyl
72-0835
Picloram
72-0826
Polychlorinated biphenyls
72-0839 72-1061
Propazine
72-1044
Pyrazon
72-1044
TCA
72-1044
Thiram
72-0817 72-1024
Trichlorfon
72-0832
Trichloropropionitrile
72-1044
2,4,5-T
72-1086
Zineb
72-1024
Rat
72-0797
Abate
72-1029
Atrazine
72-1309
Barban
72-1021 72-1044
Carbamates
72-1258
Carbaryl
72-0818 72-0830
72-1016 72-1024
Carbon Tetrachloride
72-1293
Celatox
72-1044
Chlorbufam
72-1044
Chlordane
72-0774
Chloro-IPC
72-1021
2,4-DB
72-1022
DDT
72-0774 72-0812
72-0827 72-1024
72-1064 72-1264

DDT isomers
72-1064
DFP
72-0775
Di-allate
72-1044
Dichloral urea
72-1044
Dichloronitrophenol
72-0819
Dicresyl
72-0836
Dieldrin
72-0812
Dinitro-isopropylphenol
72-0819
Dinitrophenol
72-0819
Dinoprop
72-1302
Dinoseb
72-1302
Dioxins
72-0787
Dithiocyanuric acid
72-1243
2,4-Dithio-6-methyl-s-triazine
72-1243
DNBP
72-0819
DNOC
72-0819 72-1025
EPTC
72-0818
Ethylene dibromide
72-1293
Fenitrothion
72-1237
Formothion
72-1277
Fungicides
72-1258
Granosan
72-1020
Heptachlor
72-0812 72-1087
Hexachlorobenzene
72-1037
Hexachlorobutadiene
72-0820
IPC
72-1021
Lindane
72-0785 72-0812
72-0827
Mancozeb
72-1023
Maneb
72-0822 72-0830
72-0831 72-1023
MCPA
72-1044
Mercuran
72-1020
Mercurhexane
72-1020
Methyl bromide
72-0821
Monothiocyanuvic acid
72-1243
Monuron
72-0805
NC 250
72-1297 72-1298
Organophosphates
72-1266
Ovex
72-0809
Paraoxon
72-0806
PCP
72-0799
PCP derived compounds
72-0799
Phenylmercuric bromide
72-1020
Picloram
72-0826
PMA
72-1020
Polychlorinated biphenyls
72-0839 72-1061
Polychloropinene
72-1278
Propazine
72-1044
Pyrazon
72-1044
Pyrethrins
72-0664
Sodium fluoroacetate
72-0815
TCA
72-1044
Thiram
72-0818 72-1024
Toxaphene
72-1060
Triamiphos
72-0803
Trichlorfon
72-0825
Trichloropropionitrile
72-1044
Trithiocyanuric acid
72-1243
2,4,5-T
72-0787
Zineb
72-1023 72-1024

Sheep
Atrazine
72-1310
DDT derived compounds
72-1311
DEF
72-0723 72-0835
Dicresyl
72-0836
Dinobuton derived compounds
72-1045
DNOC
72-1045
2,4-D
72-1310
Oxydemeton methyl
72-0835
Parathion
72-1062
Trichlorfon
72-0829

Shrimp
Polychlorinated biphenyls
72-1246

Toxicity/Humans
General
72-0666 72-0677
72-0984 72-1228
72-1236
Aldrin
72-0974
Arsenicals
72-1233
Azatox
72-0974
BHC
72-0673 72-0674
72-0792 72-0971
Carbamates
72-0740 72-0773
Cresotol
72-0974
DDT
72-0673 72-0674
72-0792 72-0971
72-0986 72-1127
DDT derived compounds
72-1232
DEF
72-0968
DFP
72-0730
Diazinon
72-0728 72-0734
72-1206
Dichloran
72-0730
Dichlorvos
72-1206
Diquat
72-0730
EPN
72-0792 72-1212

Fenitrothion
72-0792 72-1192
72-1206 72-1207
Fungicides
72-1233
Heptachlor
72-0730
Hydrogen cyanide
72-0769 72-1180
Lead
72-1233
Lindane
72-0986
Malathion
72-0792 72-1192
72-1207
Mercurials
72-0673 72-0695
Methyl bromide
72-1179
Methyl demeton
72-0974
Methyl Mercaptophos
72-0968
Nitro compounds
72-0971
Organochlorines
72-0740 72-0965
72-1226
Organophosphates
72-0740 72-0773
72-1221 72-1226
72-1281
Paraoxon
72-0730
Paraquat
72-0730 72-1222
72-1223
Parathion
72-0673 72-0728
72-0730 72-1192
72-1212 72-1219
Phosphine
72-1179
Polychlorinated
biphenyls
72-1230
Polychlorpinene
72-0756
Pyrethrins
72-1160
Salithion
72-1192
Thallium
72-0730 72-1233
Thiometon
72-1207
Trichlorfon
72-0994
Accidental
DDT
72-1210
Dieldrin
72-0742
Endrin
72-0742 72-0975
Hexachlorobenzene
72-0975
Methyl parathion
72-0979
Organophosphates
72-0739 72-1210
Parathion
72-1205 72-1208
Piperonyl butoxide
72-1227
Polychlorinated
biphenyls
72-0990
Pyrethrum
72-1227
Trichlorfon
72-0771 72-0772
Experimental
Azinphosmethyl
72-1073
Carbophenothion
72-1073
Disulfoton
72-1073
Mevinphos
72-1073
TDE
72-0768
Intentional
Anthraquinone
72-0985
ANTU
72-0985
Chloralose
72-0985
Diazinon
72-0733
Methyl parathion
72-0979
Organophosphates
72-1217
Thallium
72-0764
Warfarin
72-0985
Occupational
72-0765 72-0969
Aldrin
72-1344
ANTU
72-0755
Azinphosmethyl
72-0741
BHC
72-0970
Binapacryl
72-1218
Chlordane
72-0905
DDT
72-0755 72-0759
72-0980 72-1216
72-1229
DEF
72-0968
Demeton
72-0766
Diazinon
72-0741
Dieldrin
72-1344
Dinocap
72-1218
DNOC
72-1218
2,4-D
72-1229
Endrin
72-1344
Fenthion
72-1229
Heptachlor
72-0905
Hydrogen cyanide
72-0767
Kreozan
72-0988
Lindane
72-0759 72-0905
72-1216 72-1229
Malathion
72-0741 72-0905
Maneb
72-0753
Mercurials
72-1000
Methyl demeton
72-0741 72-0766
Methyl Mercaptophos
72-0968
Nitro compounds
72-0987
Organochlorines
72-0754 72-0967
72-0987 72-0995
72-1226
Organophosphates
72-0754 72-0967
72-0987 72-0995
72-1226
Paraquat
72-0729 72-1224
Parathion
72-0741
Phosphamidon
72-0741
Polychloropinene
72-0731
Radosan
72-0988
Resiston
72-0998
Trichlorfon
72-0755
Tri-o-cresyl
phosphate
72-0989

Zinc phosphide
72-0755
Zineb
72-0760
Ziram
72-0732 72-0752
Zoocoumarin
72-0755
Toxicity/Wildlife
General
72-1008 72-1211
Dibromochloropropane
72-0751
Organochlorines
72-0948
Birds
BHC isomers
72-0947
DDT
72-0762
DDT derived compounds
72-0947 72-0972
Dieldrin
72-0947
2,4-D
72-1213
Heptachlor epoxide
72-0947
Malathion
72-0735
Mercurials
72-0695
Naled
72-0966
Nitro compounds
72-1004
Organochlorines
72-0758 72-0947
72-0981 72-0982
72-1004
Organophosphates
72-0966 72-0981
72-0982 72-1004
Polychlorinated biphenyls
72-0947
Zectran
72-0966
Fish/aquatic/marine life
72-0941 72-1234
Aldrin
72-0912 72-1178
DDT
72-0909 72-0912
72-1164
Detox
72-1178
Dieldrin
72-0912
Dinoseb
72-1178
Diplitox
72-1178
Duplitox
72-1178
2,4-D
72-0743
Ekatox
72-1178
Endrin
72-0912
Heklotox
72-1178
Malathion
72-0735
Mercurials
72-0695
Methoxychlor
72-1018
Organochlorines
72-0909 72-0948
72-1225
Organophosphates
72-1225
Polychlorinated biphenyls
72-1164 72-1246
Pyrethrins
72-0664
Toxaphene
72-0912
Mammals
Aldicarb
72-0717
Carbaryl
72-0717
Carbofuran
72-0717
Chlorphenvinphos
72-0781
DDT
72-0717
Dicrotophos
72-0781
Dieldrin
72-0781
Formparanate
72-0717
Isolan
72-0781
Mobam
72-0717
Monocrotophos
72-0781
Naled
72-0966
Organophosphates
72-0966
Propoxur
72-0717
Pyrethrins
72-0664
Sarin
72-0781
Tetram
72-0781
Zectran
72-0966
Treatment of Poisoning
General
Aldrin
72-0974
Anthraquinone
72-0985
ANTU
72-0985
Arsenicals
72-0992
Azatox
72-0974
Azinphosmethyl
72-0741
Chloralose
72-0985
Cresotol
72-0974
DDT
72-0986 72-1210
Diazinon
72-0733 72-0741
Hydrogen cyanide
72-0767 72-0769
Lindane
72-0986
Malathion
72-0741
Methyl demeton
72-0741 72-0974
Organochlorines
72-0754 72-0992
Organophosphates
72-0739 72-0754
72-0992 72-1009
72-1210 72-1266
Parathion
72-0741
Phosphamidon
72-0741
Rodenticides
72-0992
Warfarin
72-0985
Atropine
Binapacryl
72-1218
DDT
72-1210
Diazinon
72-0728 72-0734
Dinocap
72-1218
DNOC
72-1218
EPN
72-1212
Organophosphates
72-1210 72-1217
Parathion
72-0728 72-1205
72-1212 72-1219
Sarin
72-0777

Trichlorfon
72-0772
Contrathion
DDT
72-1210
Organophosphates
72-1210
Parathion
72-1205
Cortisone
Binapacryl
72-1218
Dinocap
72-1218
DNOC
72-1218
Cysteine
Methyl bromide
72-0821
Diazepam
Anthraquinone
72-0985
ANTU
72-0985
Chloralose
72-0985
Warfarin
72-0985
Diuresis
Thallium
72-0764
Fuller's Earth
Paraquat
72-1224
Hemodialysis
Thallium
72-0764
Hyposulfite
Mercurials
72-1000
Methocarbamol
Strychnine
72-1214
Obidoxime
DFP
72-0775
Oximes
Diazinon
72-0728
Parathion
72-0728
Sarin
72-0802
Soman
72-0802
PAM
Carbamates
72-0773
DDT
72-1210
Organophosphates
72-0773 72-1210
Pralidoxime
Diazinon
72-0734
Paraoxon
72-0806
Parathion
72-1219
Priphynium Bromide
Carbamates
72-0773
Organophosphates
72-0773
Pyrodifenium bromide
EPN
72-1212
Parathion
72-1212
Trimedoxime
Sarin
72-0777
Unithiol
Mercurials
72-1000
Vitamins
Trichlorfon
72-0772

Abbasov, T. G.
72-1124
Abdel-Gawaad, A. A.-W.
72-0690
Abe, E.
72-0791
Absalyamov, I. F.
72-1269
Ackefors, H.
72-0719
Adie, P. A.
72-1252
Agalides, E.
72-1049
Agzamov, S. K.
72-0969
Akagi, H.
72-1123
Akasaki, K.
72-0840
Akerman, J.W.
72-0883
Al-Hachim, G. M.
72-0783
Albeaux-Fernet, M.
72-0763
Alberola, J.
72-1196
Albro, P. W.
72-1323
Aleksandrova, L. G.
72-1021
Alexander, M.
72-0784
Alexanderson, B.
72-0785
Alexandri, A. V.
72-0924
Alford, H. G.
72-0902
Allard, J.
72-1189
Alley, H. P.
72-0682
Althaus, H.
72-1336
Altmann, J.
72-1172
Alumot, E.
72-1293
Aly, O. M.
72-0701
Anderson, J. R.
72-0716
Angela, G. C.
72-0971
Araki, S.
72-1121
Archer, T. E.
72-1167
Ardatova, A. N.
72-0884
Arienti, G.
72-1286
Aripov, O. A.
72-1024
Arnold, W.E.
72-0899
Ashworth, R. J.
72-1059
Astolfi, E.
72-0900
72-0946
Atkins, L. M.
72-1048
Aucamp, J. L
72-1007
Aue, W. A.
72-1319
72-1321
Baba, N.
72-1166
Babkin, A. G
72-0837
Baer, H.
72-0839
Baginskaya, G. P.
72-0945
Bailey, E. M.
72-0992
Bailey, S.
72-1039
Bajgar, J.
72-0777
Bakhishev, G. N.
72-0821
Bakke, J. E.
72-1006
72-1047
Ballard, K. J.
72-0782
Ballschmiter, K.
72-1191
72-1282
Barabash, V. I.
72-0994
Baran, L.
72-1240
Baranchuk, J.
72-0999
Barchet, R.
72-1177
Barling, L.
72-1331
Barron, R. P.
72-0849
Basmadzhiyeva, K.
72-1025
Bauer, U.
72-1149
72-1171
Baum, P.
72-1231
Baymuradov, T. B.
72-0723
72-0835
Bazzi, B.
72-1312
Bechade, A.
72-0925
Becker, A.
72-0864
Becker, D.
72-0946
Bedford, C. T.
72-1338
Bekmayeva, A. D.
72-0874
Belisle, A. A.
72-0972
Bell, J. T.
72-1060
Bello, T. R.
72-1010
Belloni, G.
72-1228
Belov, L. G.
72-0826
Belova, R. S.
72-1022
Bencze, K.
72-0702
Bender, M. E.
72-1018
Berenderova, I.
72-1104
Berger, H.
72-0921
Berkovitch, I.
72-0691
Bermejillo, M.
72-0989
Bernstein, H. N.
72-0798
Beug, M. W.
72-0810
Bevenue, A.
72-1343
Biermann, J.
72-1177
Bindra, O. S.
72-1145
Binns, W.
72-1310
Bishara, R. H.
72-0881
Bishop, S. L.
72-1027
Bitman, J.
72-1311
Bjerk, J. E.
72-0698
72-1173
72-1183
72-1184
Bjoerklund, N. E.
72-1292
Blaber, L. C.
72-1009
Black, W. D.
72-0809
Blackman, R. R.
72-1246
Blaksley, J.
72-0946
Blanchfield, B. J.
72-1262
72-1313
Blau, S. E.
72-1056
Blois, M.
72-0776
Blok, A.
72-0900
Blus, L. J.
72-0972
Bodem, R.
72-1250
Boerner, H.
72-1265
Bogacka, T.
72-0841
72-0842
Bogolyubova, G. M.
72-1030
Bogusz, M.
72-1108
Bohn, G.
72-1107
Bollag, J. M.
72-0784
Bonderman, D. P.
72-0956
Bonelli, E. J.
72-0866
Bong, B. A.
72-0848
Bonkowsky, H. L.
72-1263
Boozer, E. L.
72-1011
Borger, M. L.
72-1168
72-1169
Borkowski, T.
72-1108
Borlaug, N. E.
72-0675
Born, G. S.
72-0881
Borneff, J.
72-0703
Borzelleca, Jr., J. F.
72-0896
Botsman, N. Ye.
72-0805
Botvin'yeva, A. M.
72-0869
Boudier, J. F.
72-0930
Bouletreau, P.
72-0769

Braunberg, R.C.
72-1052
Breazeale, P. W.
72-1001
Brech, W.
72-0764
Breen, P. T.
72-0991
Breidenbach, A. W.
72-0750
Brestkin, A. P.
72-1272
72-1290
Brik, I. L.
72-1290
Brodersen, H. C.
72-1231
Brodeur, J.
72-1066
Brouwer, E.
72-1052
Brown, L. R.
72-1162
Brown, N. L.
72-0849
Brown, V. K. H.
72-0781
Browne, T. D.
72-1224
Brzeski, Z.
72-1223
Bubien, M. Z.
72-0983
Bublik, L. I.
72-1118
Buchet, J.P.
72-0803
Buckley, N. A.
72-1156
Bunting, A. H.
72-1143
Bunyan, P. J.
72-1039
Burdick, G. E.
72-0935
Burkatskaya, Ye. N.
72-0819
Burke, J. A.
72-0848
72-1316
Businelli, M.
72-0939
72-1093
Butcher, J. W.
72-1007
Bye, A.
72-1028
Caldwell, R. L.
72-0891
Call, J. B.
72-1075
Camargo, L. A. A.
72-1237
Camougis, G.
72-1279
Campbell, D. N.
72-1109
Camper, N. D.
72-1001
Canlorbe, P.
72-0737
Capizzi, J.
72-0746
Carrasco, J. M.
72-1196
Casalis, J.
72-0930
Casida, J. E.
72-1038
72-1050
Casper, H. H.
72-1005
Caswell, R. L.
72-1314
Cehovic, G.
72-1092
Celentano, V.
72-1210
Ceylan, S.
72-1352
Chadli, A.
72-1205
Chadwick, R. W.
72-0786
72-1253
Chamberlain, J.
72-1344
Chang, R.
72-1028
Chapman, A. H.
72-1204
Charnilas, J.
72-0741
Chase, L. E.
72-1168
72-1169
Chawla, R. P.
72-0894
Cheever, K. L.
72-1029
Chen, J. Y. T.
72-0846
Chichikalo, D. I.
72-0951
Chikazawa, K.
72-1199
Chisel, I.
72-0689
Choi, P. M. K.
72-1175
Chow, W.
72-1115
Christian, J. E.
72-0881
Ciesliczak, A.
72-0843
Clapp, K. L.
72-1060
Clegg, D. J.
72-0839
72-1061
Clifford, N. J.
72-0980
Cochrane, W. P.
72-0880
Coduro, E.
72-0672
Coenen, R.
72-1137
Colas, A.
72-1225
72-1333
72-1334
Collombel, C.
72-1335
Compton, C. C.
72-1194
Conder, D. W.
72-1329
Conner, J. T.
72-0680
72-0745
Conney, A. H.
72-1028
Conroy, J. D.
72-0991
Cook, R. M.
72-1055
Cooke, A. S.
72-1034
Coon, C. N.
72-1085
Corey, J. C.
72-0877
Corneliussen, P. E.
72-0931
72-0932
Cornish, H. H.
72-0795
Cornwell, P. B.
72-1126
Cosic, V.
72-0988
Couch, J. R.
72-1085
Courtney, C. D.
72-0787
Cranmer, M. F.
72-0786
72-1253
Creger, C. R.
72-1085
Cress, C. R.
72-1072
Cristal, N.
72-0741
Cullimore, D. R.
72-1259
Cunat, P.
72-1196
Cuneio, J.
72-1304
Cunningham, H. M.
72-1260
72-1262
Cupp, D.
72-1304
Curley, A.
72-0685
Curtis, J. M.
72-0798
Cutkomp, L. K.
72-0813
Czuczwar, Z.
72-1223
Dabrowski, H.
72-1222
Dahlgren, R. B.
72-1245
Dailey, R. E.
72-1052
Dale, W. E.
72-1015
Dalgaard-Mikkelsen, S.
72-0699
Damico, J.N.
72-0849
Datta, K. K.
72-1307
Davidek, J.
72-0878
72-1342
Davidkova, K.
72-1025
Davis, W. M.
72-1279
Davison, K. L.
72-1047
72-1257
Day, H. M.
72-1235
De Medio, E.
72-1286
De Ninno, F.
72-1210
Debelyy, A. S.
72-0945
Dedde, M.
72-1332
Delatour, P.
72-0983
Delga, J.
72-0769
Demiuenko, N. M.
72-1100
Demint, R. J.
72-0720
72-0721
Denys, A.
72-1014
Derache, R.
72-0907

Deshmukh, S. N.
72-0894
Dettbarn, W. D.
72-1092
Deura, H.
72-0962
72-0963
Dewey, J. E.
72-0915
Dezoteux, H.
72-1217
DeLano, F.
72-1343
Di Siena, F.
72-0971
Dias, C. A. R.
72-1160
Dickes, G. J.
72-0920
Dikshith, T. S. S.
72-1307
Dmitriyev, A. I.
72-0725
Doguchi, M.
72-1202
Doi, T.
72-0858
Doloshitskiy, S. L.
72-1044
Donagi, A.
72-0709
Dore, I.
72-0742
Dority, R. W.
72-0846
Dorough, H. W.
72-1057
Douch, P. G. C.
72-0814
Dougherty, W. J.
72-1091
Drescher, N.
72-0927
Drill, V. A.
72-0896
Druy, E. G.
72-0804
Dubosq, F.
72-1332
Duggan, R. E.
72-0932
Durkin, J. J.
72-0744
DuBois, K. P.
72-0896
Dvoracek, G.
72-1205
Dyadicheva, T.V.
72-0818
Dzierzkowa-Borodej, W.
72-1229
Earl, F. L.
72-0798
Ebing, W.
72-1324
Edson, E. F.
72-1151
Edwards, W. M.
72-1174
Edwards, W. R.
72-0712
Egyed, M. N.
72-0999
El-Dib, M. A.
72-0701
El-Gayar, F. H.
72-0690
El-Samra, G. H.
72-0986
Eliason, B. C.
72-1026
Eliason, D. A.
72-0735
Elkins, R. E.
72-0953
Elliott, M.
72-1050
Engelhardt, G.
72-1305
Engst, R.
72-1249
Enns, T.
72-1089
Enos, H. F.
72-0845
Ensor, P. D. J.
72-0959
Epifanio, C. E.
72-1247
Erben, H. K.
72-0762
Ercegovich, C. D.
72-1114
Erne, K.
72-1292
Ernst, W.
72-1267
72-1268
Ershova, V. I.
72-1024
Essary, E. O.
72-0954
Eyl, T. B.
72-1141
Fabbrini, R.
72-1312
Faff, J.
72-1220
72-1221
Faina, L.
72-1285
Farris, D. E.
72-0904
Farrow, R. P.
72-0953
Fattori, G.
72-1285
Fawkes, J.
72-1323
Fazekas, I. G.
72-0979
Fechner, G.
72-0921
Fedrazzoni, U.
72-1228
Feklisova, L. S.
72-1117
Ferrone, S.
72-1093
Feucht, M.
72-1177
Fidelus, J.
72-1350
Filbert, M. G.
72-1068
Firestone, D.
72-0849
Fischer, H.
72-1236
Fishbein, L
72-1323
72-1331
Fiskac, A.
72-0738
Fleisher, J. H.
72-0802
72-1068
Flickinger, E. L.
72-0966
Floru, S.
72-0923
Focht, D. D.
72-1261
Foltinova, J.
72-1243
Fomicheva, L. G.
72-1339
Forbes, L. S.
72-0888
Ford, E.
72-0776
Ford, E. J. H.
72-1013
Forester, J.
72-1246
Fountain, J. E.
72-1214
Fournier, E.
72-0906
Franchetti, P.
72-1294
Franci, M.
72-0928
Frank, P. A.
72-0720
Franz, H. E.
72-0764
Frawley, J. P.
72-0896
Frei, R. W.
72-1318
72-1320
72-1325
72-1326
Fries, G. F.
72-1311
Fritsch, W.
72-1137
Froeslie, A.
72-1045
Fujita, M.
72-1123
Fukami, T.
72-0901
Funk, K.
72-0919
Funnell, H. S.
72-1063
72-1251
72-1308
Furuta, T.
72-1238
Fusi, P.
72-0928
Gadsden, R. H.
72-1048
Gagne, J.
72-1066
Gaity, A.
72-1286
Gale, G. R.
72-1048
Gallagher, B. B.
72-1227
Gangstad, E. O.
72-1163
Gar, K. A.
72-0804
Garbut, A.
72-1028
Gardiner, E. E.
72-1306
Garrison, A. W.
72-0714
Gavrilescu, C.
72-0689
Gavryuk, A. P.
72-0951
Gehring, P. J.
72-0730
72-0797
Geike, F.
72-0879
72-0882
Gertig, H.
72-1241
72-1242
Gesink, R. W.
72-0883
Ghezzo, F.
72-1228
72-1232
Gibel, W.
72-0761

Gibson, J. R.
72-1274
Gilluly, R. H.
72-1164
Giorgini, D.
72-1286
Giraud, P. A.
72-0984
Gish, C. D.
72-0972
Gitzowa, S.
72-0708
Giurgea-Jacob, R.
72-1256
Glass, B. L.
72-0955
Glebkashanskaya, N. V.
72-1269
Glick, B.
72-1088
Glowaczewska, I.
72-0974
Godovikov, N. N.
72-1290
Goetzmann, S.
72-1137
Goldberg, L.
72-0896
Golubev, T. I.
72-1101
Goncharov, V. P.
72-0772
Goncharuk, G. A.
72-1020
Gonzales Gomez, C.
72-1095
Gopinath, C.
72-1013
Gorban', G. P.
72-0805
72-1043
Goto, K.
72-1195
72-1226
Goulding, R. L.
72-0746
Goursaud, J.
72-0930
Graber, C. D.
72-1091
Graham, S. L.
72-1258
Grant, D. L.
72-0838
72-0839
72-1061
72-1188
Green, R. E.
72-0877
Greenberg, R. E.
72-0712
Greenfield, S. M.
72-1133
Greenslade, R. J.
72-0920
Greger, H.
72-0924
Greichus, Y. A.
72-1245
Grifantini, M.
72-1294
Grigor'yeva, T. I.
72-0952
72-1278
Grimes, D. J.
72-0715
Gruen, L.
72-0943
Guardigli, A.
72-1115
Guarino, A. M.
72-1075
Gummel, H.
72-0761
Gurdaliyev, Kh. Kh.
72-1290
Gustafsson, J.-A.
72-0768
Gutsche, B.
72-0860
Gzhegotskiy, M. I.
72-1044
Haag, T.
72-1177
Haan, C. T.
72-1186
Hadorn, H.
72-1105
Haertig, H.
72-1249
Hahn, H.
72-1346
Hall, S. M.
72-1086
Hamad, M. A.
72-0690
Hansen, W. H.
72-1258
Hara, Y.
72-1122
Harada, H.
72-1201
Harris, E. J.
72-0935
Harris, L. W.
72-0802
72-1068
Hashimoto, A.
72-0736
Hashimoto, Y.
72-1004
Haux, E. H.
72-0696
Hawk, R. E.
72-1011
Hawkins, K.I.
72-0865
Hayashi, T.
72-1122
Hayes, Jr., W. J.
72-0896
72-1127
Hearn, C. E. D.
72-0729
Heinisch, E.
72-1328
Heizler, W.
72-0864
Hellwig, A.
72-1327
Helson, L.
72-1033
Hempel, D.
72-1327
Hengy, H.
72-1096
Henneberg, M.
72-1302
Herrmann, R.
72-0860
Herzel, F.
72-0688
Higa, J.
72-0900
Hill, D. W.
72-0714
Hill, E. F.
72-0735
72-1015
72-1244
Hill, E. G.
72-0676
Hilton, H. W.
72-0958
Hinagata, K.
72-1195
Hironaka, R.
72-1306
Hoernicke, E.
72-0921
Holden, A. V.
72-1234
Holt, G.
72-1173
Hood, R. D.
72-1027
Hopkins, D. P.
72-0697
Horak, E.
72-1185
Horak, F.
72-1243
Hori, M.
72-0892
Horiba, M.
72-0857
Hoshide, M.
72-0710
Howard, Jr., F. M.
72-1233
Hrdina, P. D.
72-1064
Hrdina, V.
72-0777
Hunter, C. G.
72-1338
Hurtt, W.
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Husak, S.
72-0738
Hutton, C. J.
72-1111
Hybertson, R. L.
72-1275
Ichaporia, R. N.
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Ichikawa, H.
72-0793
Ide, A.
72-0727
Ide, I.
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72-1226
Imoto, T.
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Irukayama, K.
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Ishii, Y.
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Ishikawa, K.
72-0840
Ishikawa, T.
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Israeli, R.
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Ito, K.
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Ito, N.
72-1012
Ivanchenko, V. V.
72-0868
Ivanova-Chemishanska, L.
72-1023
Ivanovtsev, V. V.
72-0834
Iwahara, S.
72-1299
Iwanishi, N.
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Iwasaki, I.
72-1281
Iwasaki, N.
72-1296
Izmaylova, G. D.
72-1100
Jakl, A.
72-0777
Janda, J.
72-1008
Janes, N. F.
72-1050

Janicki, R. H.
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Jarabak, J.
72-1276
Jardine, R. V.
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Jayaram, M.
72-1120
Jelinek, O.
72-0738
Jennings, D. S.
72-1215
Job, J. C.
72-0737
Johnson, A. E.
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Johnson, J. L.
72-0847
Jones, V. J.
72-0782
Jori, H.
72-1177
Joshi, L. G.
72-0733
Joubert, S. M.
72-1037
Jukes, T. H.
72-1161
Kabachnik, M. I.
72-1290
Kacew, S.
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72-1064
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Kadyrov, U. S.
72-0835
Kaemmerer, K.
72-0823
Kajiwara, M.
72-1296
Kakihara, Y.
72-1121
Kaku, S.
72-0710
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72-1226
Kale, A. K.
72-0733
Kamil'dzhanov, A. Kh.
72-0949
Kamps, L. R.
72-0848
Kan, T.
72-1201
Kanazawa, J.
72-0692
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72-0694
Kanda, M.
72-1042
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Kantelip, J. P.
72-1289
Karatsu, M.
72-1195
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Karczmar, A. G.
72-1009
Kardanov, N. A.
72-1290
Karnik, V. M.
72-0734
Karpenko, V. N.
72-0817
72-0819
Karpinskaya, Ye. V.
72-1030
Kasimov, T.
72-1203
Kaskevich, L. M.
72-0754
Kataoka, S.
72-1121
Kato, S.
72-1122
Kato, Y.
72-1238
Katsenovich, R. A.
72-0967
Kaufman, W. M.
72-1349
Kawai, M.
72-1299
Kawai, S.
72-0903
Kawano, Y.
72-1343
Kazmierczak, A.
72-0995
Kazmierczak, T.
72-1140
Kchouk, M.
72-1205
Keil, J.
72-1091
Keil, R.
72-1351
Keir, W.
72-0729
Kendler, J.
72-0709
Kennedy, M. V.
72-1113
Kesberger, H.
72-1137
Khaitov, R. Kh.
72-0835
Khan, W.
72-1111
Khasanov, V. Kh.
72-0968
Khasanov, Yu. U.
72-0949
Khera, K.
72-0839
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Khokhryakova, V. S.
72-0804
Khovayeva, L. A.
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Kilpatric, J. W.
72-0735
Kim, E. S.
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Kinter, W. B.
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Kirlich, A. Ye.
72-0830
72-0831
Kirzon, M. V.
72-0815
Klein, A. K.
72-1052
Klenova, A. A.
72-0833
Klisenko, M. A.
72-1021
72-1098
72-1099
72-1340
Knittle, C. E.
72-0865
Kobayashi, A.
72-0918
Koch, R. B.
72-0813
Kodama, Y.
72-1297
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Koga, Y.
72-1195
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Kolesnichenko, T. S.
72-1003
Kolmodin-Hedman, B.
72-0785
Komarova, A. A.
72-0732
Komissarenko, V. P.
72-1255
Konickova, J.
72-0850
Kop, P.
72-0988
Koransky, W.
72-0801
Korenevs'kyy, L. I.
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Koshcheyev, A. K.
72-1106
Kosmatyy, Ye. S.
72-0873
72-1118
Kostyuk, O. T.
72-0731
Kotlarek-Haus, S.
72-1229
Kovac, J.
72-1104
Kozhinova, L. A.
72-0952
72-1278
Krampitz, G.
72-0762
Kratky, B. A.
72-1353
Kravchenko, V. I.
72-1295
Kravtsova, O. L.
72-1291
Kroeller, E.
72-0859
Krupa, A.
72-1223
Kuchak, Yu. A.
72-1102
Kulikov, V. I.
72-0869
Kulikova, A. I.
72-1030
Kunitake, E.
72-1297
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Kurasiak, K.
72-0843
Kuratsune, M.
72-1230
Kurchatova, G.
72-1025
Kuroiwa, Y.
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Kurtz, D.
72-0985
Kurtz, D. A.
72-1168
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Kusevitskiy, I. A.
72-0830
Kusic, R.
72-0988
Kutty, K. M.
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Kuwahara, S.
72-0861
Kuwahara, Y.
72-1195
72-1226
Kuzelova, M.
72-0998
Kynast, G.
72-1346
Lacroix, J. B.
72-1062
Lahmann, E.
72-0688
Lamoureux, G. L.
72-1047

Landry, J. L.
72-0933
Lane, D.
72-0776
Langhein, J.
72-1137
Lapchenko, V. S.
72-1277
Larini, L.
72-1237
Larson, J. D.
72-1006
Lauwerys, R.
72-0803
Lawinska, B.
72-1229
Lawrence, J. F.
72-1320
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Lawson, J. M.
72-1338
Le Moan, G.
72-0660
Leberl, C.
72-0801
Lebhar, J.
72-0984
Lebreton, P.
72-0981
72-0982
Lech, J. J.
72-1080
Lechner, M. C.
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Lee, D. F.
72-1347
Lefar, M. S.
72-1115
Legay, D. S.
72-1326
Lerenard, A.
72-1333
72-1334
Lester, J. F.
72-1330
Leveille, G. A.
72-1082
Levin, W. M.
72-1028
Levy, J.
72-1014
Lewin, P.
72-1158
Leybovich, D. L.
72-0827
Li, A. P.
72-0968
Liebmann, R.
72-1327
Linder, R. L.
72-1245
Lindquist, N. G.
72-0779
Ling, G. M.
72-1032
Link, J. D.
72-1052
Linss, G.
72-0760
Lisboa, B. P.
72-0768
Lisk, D. J.
72-0935
Listopadova, E.
72-1185
Litvishchenko, F. I.
72-0771
Liu, H. J.
72-0706
Livshits, O. D.
72-1106
Lochner, M. A.
72-1068
Locke, R. K.
72-1112
Loefroth, G.
72-0911
Logaras, G.
72-1219
Lopez Gonzales, J. de D.
72-1095
Lovett, J.
72-0937
Lowry, R. R.
72-1264
Lucarelli, C.
72-1294
Luckas, K. H.
72-1107
Lunin, J.
72-1155
Luquet, F. M.
72-0930
Lutz-Ostertag, Y.
72-0789
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Lutz, H.
72-0789
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Maciejewska, K.
72-0974
Macklin, A. W.
72-1209
Madaric, A.
72-0844
Madden, J. L.
72-0663
Maes, R.
72-0740
Magat, A.
72-0983
Magness, J. R.
72-1194
Mahel'ova, H.
72-1104
Maier-Bode, H.
72-1150
Maj, J.
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Majumder, S. K.
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Makarova, S.V.
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Makino, K.
72-1271
Malakhova, A. V.
72-1278
Mallet, V.
72-1318
Malyutina, L. M.
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Mamleyev, S. R.
72-0837
Manabe, Y.
72-1212
Maneckjee, A.
72-1064
Mansager, E. R.
72-1058
72-1322
Manturovskaya, N. V.
72-0816
Marciniak, J.
72-1222
Markle, G. M.
72-1194
Martinez, M.
72-1196
Martson', L. V.
72-0752
Martz, F.
72-1076
Marugami, M.
72-1012
Masuda, T.
72-0961
Mathew, T. V.
72-1103
Matokhnyuk, L. A.
72-0753
72-0822
Matsumoto, H.
72-0710
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72-1226
Matsumura, A.
72-0799
Matsuo, S.
72-0710
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Matsushima, S.
72-0704
72-0792
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Matsuzaka, J.
72-1230
Matumoto, K.
72-1121
Maul, R. E.
72-0919
Mauranges, P.
72-0975
Mayer, F. L.
72-0808
Mayer, O.
72-0775
Mayorova, T. N.
72-1100
Mayr, G. E.
72-0957
Mayzel', Ye. B.
72-1272
Mazzella di Bosco, M.
72-1218
McBain, J. B.
72-1038
McCollister, D. D.
72-0896
McCully, K. A.
72-0838
McKay, D. H.
72-1252
McKinney, J. D.
72-1011
72-1331
McLeod, H. A.
72-1188
Mee, J. M. L.
72-0958
Mega, T.
72-1012
Mega, Y.
72-1300
Mehendale, H. M.
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Mehta, A. B.
72-0733
Meiniel, R.
72-0789
Merenyuk, G. V.
72-0824
Merkens, L. S.
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Merna, J. W.
72-1018
Messer, J. W.
72-0937
Metelitsa, V. K.
72-0832
72-0886
Meuser, F.
72-1179
72-1180
Michalek, H.
72-0775
Michel-Ber, E.
72-1014
Mikolajek, A.
72-1350

Miles, J. W.
72-1015
Milhaud, G.
72-0925
Mills, P. A.
72-0848
Milosavljevic, Z.
72-0987
Milosevic, M.
72-0806
Miranda, C. L.
72-1087
Mitchell, W. G.
72-0934
Mitra, S. N.
72-1103
Miura, S.
72-1238
Mizyukova, I. G.
72-0821
Model', A. A.
72-0756
Mollweide, H.-U.
72-0713
Moore, J. A.
72-0787
Moraghan, J. T.
72-0922
Moriarty, F.
72-1165
Moseman, R. F.
72-1319
Mossel, D. A. A.
72-0943
Motin, J.
72-0767
72-0769
Muench, W. D.
72-1135
72-1182
Muir, C. M. C.
72-0781
Mukhamedshin, R. A.
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72-0837
Mukherjee, A. K.
72-1103
Mukherjee, G.
72-1103
Mukhtarova, N. D.
72-0731
Munro-Faure, A. D.
72-1028
Murai, Y.
72-0990
Murakami, K.
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Murakami, Y.
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Murphy, L.
72-1033
Murphy, S. D.
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Murthy, G. K.
72-0937
Myhr, B. C.
72-1081
Myrtle, J. F.
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Nachtomi, E.
72-1293
Nagasaki, H.
72-1012
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Nagase, M.
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Nakanishi, M.
72-1238
Natoff, I. L.
72-0790
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72-1301
Naumann, K.
72-1283
72-1284
Nayshteyn, S. Ya.
72-0827
Negele, R. D.
72-0941
Nelson, D. M.
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Nepoklonov, A. A.
72-0832
72-0886
Nestase, V.
72-1178
Neykovska, L.
72-1025
Nezefi, T. A.
72-1309
Nicholas, P. V.
72-0920
Nicholson, H. P.
72-1152
Niehuss, M.
72-1265
Nielsen, S. W.
72-0893
Niemi, W. D.
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Niki, Y.
72-0727
Nikolayev, A. V.
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Nikonova, T. V.
72-1003
Nimmo, D. R.
72-1246
Ninagata, K.
72-1226
Nishi, S.
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Nishida, K.
72-1202
Nishimoto, T.
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Niwayama, K.
72-1202
Nizov, A. A.
72-1000
Noack, G.
72-0801
Nobutomo, K.
72-1297
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Norman, A. W.
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Novy, J. R.
72-1018
Nowaczyk, W.
72-1241
72-1242
Nowicki, H. G.
72-1053
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Nuorteva, P.
72-0695
Ogata, Y.
72-1121
Ogg, Jr., A. G.
72-0936
Ogurok, A. P.
72-0976
Ohno, M.
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Ohto, K.
72-0773
Okamura, T.
72-1296
Olefir, A. I.
72-0825
Olin, J. F.
72-1051
Oloffs, P. C.
72-1329
Omirov, P. Yu.
72-1019
Orlova, N. V.
72-1016
Owen, W. J.
72-0794
Ozan, K.
72-1352
Ozawa, T.
72-1212
Paccagnella, B.
72-1228
Pack, D. E.
72-0960
Pakkala, I. S.
72-0935
Palmer, J. S.
72-1303
Pantaleo, S.
72-0916
Paradelis, A.
72-1219
Parra, L. A.
72-1190
Patterson, C.
72-0910
Paulian, F.
72-0923
Pearson, T. R.
72-1090
Peck, A. W.
72-1028
Pekas, J. C.
72-1005
Pendleton, R. F.
72-0915
Pennino, G.
72-1210
Peoples, A. J.
72-0786
72-1253
Perelygin, V. M.
72-1024
Perevoznikov, M. A.
72-0837
Perini, G.
72-1232
Perrot, L.
72-1335
Peters, D. A. V.
72-1064
Petrosini, G.
72-1093
Petrovskiy, V. V.
72-0722
Pfeiffer, E.W.
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Phillips, W. E. J.
72-0838
72-0839
72-1061
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Piazolo, P.
72-0764
Pilinskaya, M. A.
72-0752
Pillmore, R. E.
72-0966
Pimentel, D.
72-0914

Pinault, L.
72-0925
Pineda, E.
72-0946
Pionnat, J. C.
72-1348
Piotrowski, H. D.
72-1137
Piroskov, B.
72-0988
Pirotta, M.
72-1285
Pis'mennaya, M. V.
72-1099
Plapp, R.
72-1305
Platonov, N. S.
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72-1251
72-1308
Pliss, G. B.
72-1017
Poeplau, W.
72-1231
Polizu, A.
72-0923
72-0924
Popov, L. G.
72-0951
Popov, T.
72-1025
Porcellati, G.
72-1285
72-1286
Posner, H. S.
72-1026
Potapenko, V. M.
72-0951
Poteryayeva, G. Ye.
72-0820
Pousada, C. R.
72-0774
Prati, L.
72-1228
Preiss, D.
72-1250
Prellwitz, W.
72-1231
Price, J. W.
72-1204
Primo, E.
72-1196
Pritchard, J. B.
72-1079
Prodanovic, M.
72-0987
Prouty, R. M.
72-0972
Puletti, E. J.
72-1073
Putnam, R. C.
72-0749
Quentin, K.-E.
72-0708
Quereda, M. A.
72-1095
Rabinovich, A.
72-0946
Radice, M.
72-1312
Ragab, M. T. H.
72-1119
Rajendra, M. K.
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Rakhmatullayev, N. N.
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Rakhmatullayeva, M. D.
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Rall, D. P.
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Ramade, F.
72-0758
Rappoport, M. B.
72-0757
72-0822
Raskin, M. A.
72-0940
Rasuleva, M. A.
72-0766
Rauscher, H.
72-0957
Read, Jr., R. B.
72-0937
Reichenbach-Klinke, H. H.
72-0700
72-0941
Reifenstein, H.
72-1328
Reiter, L.
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Ress, J.
72-0849
Reynolds, III, H. V.
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Reynolds, L. M.
72-0947
Reznikov, O. M.
72-1291
Ribelin, W. E.
72-1209
Ribner, J. A.
72-1227
Richmond, M. L.
72-0966
Rider, J. A.
72-1073
Ritchey, S. J.
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Robinson, J.
72-0707
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Rogers, L. J.
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Rohrlich, M.
72-1179
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Rolly, G.
72-0728
Rosales, J.
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Rosic, N.
72-0806
Rossner, J. A.
72-1250
Roudabush, R. L.
72-0896
Roughan, J. A.
72-1347
Rousek, E. J.
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Rouzioux, J.-M.
72-0769
Royer, J.
72-1333
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Rozengart, V. I.
72-1030
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72-1272
Rozin, D. G.
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Rubenchik, B. L.
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Ruecker, G.
72-1107
Ruediger, K.
72-0860
Rugh, M. C.
72-1168
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Runser, D. J.
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Ryan, A. J.
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Saad, W. A.
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Sacher, R. M.
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Sadriyeva, R. V.
72-1269
Saila, S. B.
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Sakagami, Y.
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Sakamoto, F.
72-0727
Saley, P. I.
72-0724
72-0770
Sand, P. F.
72-0933
Sangha, G. K.
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Saschenbrecker, P. W.
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72-1308
Satoh, H.
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Satyvaldiyev, A. S.
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Sauli, M.
72-1332
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Scala, R. A.
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Scarponi, L.
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Schafer, M. L.
72-0937
Schemmel, R.
72-1082
Schiweck, H.
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Schmidt-Hebbel, H.
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Schmidt, T. J.
72-1083
Schnaak, W.
72-1249
Schneider, R. P.
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Schoenborn, H.
72-1231
Schoene, K.
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72-0801
Schuphan, I.
72-1191
72-1282
Schuster, H. P.
72-1231
Schwartz, M. K.
72-1033
Schwetz, B. A.
72-0797
Schylla, G.
72-1231
Seiber, J. N.
72-1116
Seidensticker, IV, J. C.
72-1187

Seidler, H.
72-1249
Seifert, J.
72-0878
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Sell, J. L.
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Serine, E. A.
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Shabad, L. M.
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Shafik, M. T.
72-0845
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72-0733
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Shestakov, N. M.
72-1000
Shigenaga, A.
72-1198
Shiller, J. W.
72-1109
Shimabukuro, R. H.
72-1047
Shinohara, R.
72-0840
Shiplov, J. J.
72-1091
Shiramizu, M.
72-1195
72-1226
Shishido, T.
72-1280
Shmigidina, A. M.
72-1340
Short, C. E.
72-1304
Shpirt, M. B.
72-1024
Shtenberg, A. I.
72-1016
Shtyler, S. Yu.
72-0870
72-0950
72-1337
Shuman, Jr., F. L.
72-0748
72-1113
Sidell, F. R.
72-1069
Sidenko, I. N.
72-0869
Siebers, D.
72-1248
Sierzant, M.
72-1242
Sikorski, M.
72-1222
Silk, P. J.
72-0706
Singhal, R. L.
72-1032
72-1064
72-1065
72-1071
Sirchia, G.
72-1093
Sjokvist, F.
72-0785
Skrabielinski, R.
72-0974
Skrentny, R. F.
72-1057
Skrinde, R. T.
72-0876
Slach, E.
72-0956
Slatov, I.V.
72-0950
Slen, S. B.
72-1306
Slife, F. W.
72-1170
Slominska-Zurek, J.
72-1239
Smalley, H. E.
72-0798
Smiley, J. W.
72-1330
Smith, A. E.
72-0926
72-1259
Smith, J. N.
72-0814
Soedergren, A.
72-0929
Soerensen, O.
72-1336
Sokolova, L. A.
72-1022
Solov'yeva, L. F.
72-0887
Sowinska, H.
72-1240
Spalding, J. W.
72-0776
Sparschu, G. L.
72-0797
Spielholtz, G. I.
72-0862
Sprott, J. M.
72-0904
St. Omer, V. V. E.
72-0812
Stach, R.
72-1239
Stalling, D. L.
72-0847
Stanford, C. L.
72-0934
Stanislavova, M.
72-1243
Staton, W. S.
72-0746
Stein, M. L.
72-1294
Steinberg, R. J.
72-0862
Stelzer, R.
72-1248
Stepanek, O.
72-0998
Stern, J.
72-0741
Stieglitz, R.
72-0759
Still, G. G.
72-1058
72-1322
Stobbe, H.
72-0759
Stojanovic, B. J.
72-1113
Stoltenberg, D. H.
72-0938
Storherr, R. W.
72-1315
Straw, J. A.
72-1076
Street, J. C.
72-1056
Street, M. A.
72-1276
Strother, A.
72-1072
72-1254
Sugaya, T.
72-0965
Suggs, J. E.
72-1011
Sullivan, H. C.
72-0845
Sullivan, J. B.
72-0957
Sullivan, R.
72-0683
Sundby, R.
72-1184
Supin, G. S.
72-0868
72-0872
Suteu, E.
72-1256
Suvak, L. N.
72-0942
Svensson, B.
72-0929
Swader, J. I.
72-1073
Swartz, R. D.
72-1069
Szabuniewicz, M.
72-0992
Szelag, J.
72-0974
Szeto, Y. S.
72-1329
Szokolay, A.
72-0702
72-0844
72-1104
Tabor, E. C.
72-0747
Tadjer, G. S.
72-0742
72-0999
Tafuri, F.
72-0939
72-1093
Takahama, K.
72-1042
72-1121
Takase, M.
72-1212
Talan, K. A.
72-1019
Talens, G. M.
72-1074
72-1090
Taljaard, J. J. F.
72-1037
Tanimura, A.
72-1122
Tarkov, M. I.
72-0824
Tarrant, R. F.
72-1189
Tateishi, M.
72-1195
72-1226
Tatsukawa, R.
72-0674
Taue, S.
72-1199
Taylor, A. W.
72-1174
Taylor, R.
72-0842
Teli, P. M.
72-1321
Tempe, J. D.
72-0985
Thalenhorst, W.
72-1153
Thirion, J.
72-1096
Thomas, R. F.
72-0959
Thompson, F. B.
72-0678
72-0679
72-1138
Threewit, T. B.
72-1170

Timchenko, L. A.
72-0824
Timofeyeva, N. T.
72-0755
Tindle, R. C.
72-0847
Tinsley, I. J.
72-1264
Tishkov, A. I.
72-0770
Titov, S.A.
72-0815
Tokha-El-Sherif, M. M.
72-0829
Tomii, S.
72-1012
72-1300
Toralballa, C.
72-0862
Torbert, B. J.
72-1010
Torre, C.
72-1031
Toscano, R. A.
72-1167
Totani, T.
72-1201
Trabka, J.
72-1239
Tret'yak, M. G.
72-0873
Tron'ko, M. D.
72-1295
Trondina, G. A.
72-0885
Troshko, Ye. V.
72-0945
Truhaut, R.
72-0807
72-0905
Trzciankowska, A.
72-0974
Tsachalinas, D.
72-1219
Tschudy, D. P.
72-1263
Tsukano, Y.
72-0918
Tucker, B. V.
72-0960
Turchin, I. S.
72-1255
Turner, B. C.
72-1174
Turner, J.C.
72-0814
Ubertalle, A.
72-1193
Uhnak, J.
72-0844
Ulfstrand, S.
72-0929
Ullberg, S.
72-0779
Unger, I.
72-0706
Ungern-Sternberg, A. von
72-1231
Unterman, W. H.
72-0689
Uporova, G. I.
72-0870
72-0950
72-1337
Urabe, T.
72-1297
72-1298
Ushio, F.
72-1202
Usmanova, I. Y.
72-0967
Uyeta, M.
72-1199
Vacher, J.
72-0984
Vangeli, V. S.
72-0993
Varela-Alvarez, H.
72-1168
72-1169
Vartic, N.
72-1256
Vassal, J.
72-0737
Vatutin, N. T.
72-0772
Vayntraub, F. P.
72-0872
Vea, E. V.
72-0813
Vengerskaya, Kh. Ya.
72-1097
72-1100
Verblyudova, N. I.
72-1098
Vermeer, K.
72-0947
Vermeire, P.
72-0728
Verschuuren, H. G.
72-0726
Vertalier, S.
72-1332
Vetulian, J.
72-1239
Villeneuve, D. C.
72-0838
72-0839
72-1061
72-1062
Vinceneux, P.
72-1217
Vinogradov, A. F.
72-0739
Viraraghavan, T.
72-0670
Visek, W. J.
72-1083
Visweswariah, K.
72-1120
Vitkalov, V. P.
72-0770
Volkova, R. I.
72-1290
Volkova, V. A.
72-1101
Vora, D. D.
72-0733
Vorob'yeva, N. M.
72-1277
Voytekhova, V. A.
72-0944
Vrochinskiy, K. K.
72-0948
Wadia, R. S.
72-0734
Wadso, I.
72-0850
Wakatsuki, T.
72-0673
Wakeling, A. E.
72-1083
Walb, D.
72-0764
Walker, E. A.
72-0684
Walker, E. M.
72-1048
Wallnoefer, P. R.
72-1305
Walsh, G. M.
72-1273
Wanic, W.
72-1222
Warren, G. F.
72-1353
Waseda, Y.
72-1041
Watanabe, H.
72-0727
72-1122
Watanabe, S.
72-1192
Watanobe, S.
72-1208
Webb, G. D.
72-1067
Webb, R. E.
72-1087
Wehby, A. J.
72-0937
Weil, J.
72-0980
Weil, L.
72-0708
Weinberg, A. M.
72-0897
Weinmann, W. D.
72-1341
Weintraub, M. I.
72-1227
Wells, M. R.
72-1088
Welsch, F.
72-1092
Westing, A. H.
72-0889
72-0898
Weyant, J. R.
72-1311
White, M. N.
72-0935
Whorton, J. C.
72-1128
Wiersig, D. O.
72-0992
Wiersma, G. B.
72-0933
72-0934
Wildbrett, G.
72-0702
Wilk, G.
72-0764
72-1177
Wilks, L. P.
72-1146
Willems, J.
72-0728
Willes, R. F.
72-1062
Williams, C. S.
72-0681
72-1130
72-1159
Williams, D. T.
72-1260
72-1262
72-1313
Wilson, B. P.
72-0880
Wilson, Jr., A. J.
72-1246
Wilson, K. A.
72-1055
Wilson, L. L.
72-1168
72-1169
Wilson, W. E.
72-1077
Witkonton, S.
72-1114
Witt, J. M.
72-0746
Wittig, G.
72-0761
Wolfe, H. R.
72-0973
Wollner, N.
72-1033
Wong, H. G.
72-1053

Wood, J. M.
72-0718
Woolley, D. E.
72-1074
72-1090
Woolson, E. A.
72-0959
Wrenn, T. R.
72-1311
Yamagiwa, J.
72-0736
Yamaguchi, A.
72-1230
Yamaguchi, H.
72-1198
Yamaguchi, S.
72-0710
72-1195
72-1226
Yamamoto, I.
72-0667
72-1038
Yamamura, H. I.
72-0802
72-1068
Yamazoe, R.
72-1201
Yap, H. H.
72-0813
Yarbrough, J. D.
72-1088
Yefimova, L. I.
72-1339
Yip, G.
72-1317
Yoshida, Y.
72-1296
Yoshimura, T.
72-1230
Young, R. W.
72-0954
Yuki, F.
72-1110
Yurasova, O. I.
72-0952
Yushima, K.
72-0692
72-0693
72-0694
Zabezhinskiy, M. A.
72-1017
Zabik, M. E.
72-0919
Zabik, M. J.
72-0919
Zabolotnyy, K. F.
72-0886
Zamfir, G.
72-1178
Zanella, A.
72-1093
Zaritskaya, L. A.
72-0756
Zavon, M. R.
72-0662
Zaytseva, L. D.
72-0836
Zelinskaya, O. V.
72-1097
Zerbe, J.
72-0843
Zhabin, V. A.
72-0771
Ziegler, J. H.
72-1168
72-1169
Zietek, M.
72-1350
Zimin, V. B.
72-1213
Zinchenko, V. A.
72-1287
Zitko, V.
72-1175
Zopf, L. G.
72-1142
Zotkina, V. P.
72-0732
Zuercher, K.
72-1105

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